Voluntary use of social media for formal learning : an investigation of using self-regulated learning strategies from the social cognitive perspective

Zhou, Quan

2019

Zhou, Q. (2019). Voluntary use of social media for formal learning : an investigation of using self-regulated learning strategies from the social cognitive perspective. Doctoral thesis, Nanyang Technological University, Singapore.

<https://hdl.handle.net/10356/92272>

<https://doi.org/10.32657/10220/49454>

**NANYANG
TECHNOLOGICAL
UNIVERSITY**

**VOLUNTARY USE OF SOCIAL MEDIA FOR FORMAL LEARNING:
AN INVESTIGATION OF USING SELF-REGULATED LEARNING
STRATEGIES FROM THE SOCIAL COGNITIVE PERSPECTIVE**

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WEE KIM WEE SCHOOL OF COMMUNICATION AND INFORMATION

2019

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STRATEGIES FROM THE SOCIAL COGNITIVE PERSPECTIVE**

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A thesis submitted to the Nanyang Technological University
in partial fulfillment of the requirement for the degree of
Doctor of Philosophy

2019

Statement of Originality

I hereby certify that the work embodied in this thesis is the result of original research, is free of plagiarised materials, and has not been submitted for a higher degree to any other University or Institution.

July 21, 2019

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Date

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Supervisor Declaration Statement

I have reviewed the content and presentation style of this thesis and declare it is free of plagiarism and of sufficient grammatical clarity to be examined. To the best of my knowledge, the research and writing are those of the candidate except as acknowledged in the Author Attribution Statement. I confirm that the investigations were conducted in accord with the ethics policies and integrity standards of Nanyang Technological University and that the research data are presented honestly and without prejudice.

21 July 2019

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Date

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Assoc. Prof. Lee Chei Sian

Authorship Attribution Statement

This thesis contains materials from one paper presented at the following conference and from two papers published in the following peer-reviewed conference proceedings in which I am the first author.

Part of Study 1 in Chapter 3 is presented as Zhou, Q., Lee, C.S., & Sin, S.-C. J. (2017, May). *Voluntary use of social media for formal learning: An investigation of using self-regulated learning strategies*. Paper presented at the 67th Annual Conference of International Communication Association (ICA) - Instructional & Developmental Communication Division, San Diego, USA.

The contributions of the co-authors are as follows:

- Dr. Lee Chei Sian and Dr. Sin Sei Ching Joanna provided guidance on the research direction and research design.
- I conducted the literature review, data collection, data analysis, and drafted the manuscript.
- Dr. Lee Chei Sian and Dr. Sin Sei Ching Joanna contributed to refining the manuscript.

Part of Study 1 in Chapter 3 is published as Zhou, Q., Lee, C. S., & Sin, S.-C. J. (2017). Using Social Media in Formal Learning: Investigating Learning Strategies and Satisfaction. In S. Erdelez & N.K. Agarwal (Eds.), *Proceedings of the Association for Information Science and Technology* (pp. 472–482.) Hoboken, NJ: Wiley.

The contributions of the co-authors are as follows:

- Dr. Lee Chei Sian and Dr. Sin Sei Ching Joanna provided guidance on the research direction and research design.
- I conducted the literature review, data collection, data analysis, and drafted the manuscript.
- Dr. Lee Chei Sian and Dr. Sin Sei Ching Joanna contributed to refining the manuscript.

Part of Study 2 in Chapter 4 is published as Zhou, Q., Lee, C. S., & Sin, S.-C. J. (2018). Beyond mandatory use: Probing the affordances of social media for formal learning in the voluntary context. In L. Freund (Ed.), *Proceedings of the Association for Information Science and Technology* (pp. 608–617.) Hoboken, NJ: Wiley.

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- Dr. Lee Chei Sian and Dr. Sin Sei Ching Joanna contributed to refining the manuscript.

July 21, 2019

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Date

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Zhou Quan

ACKNOWLEDGEMENT

The completion of this thesis marks the end of the PhD chapter of my life, which could not have been possible without the support and help from many people.

First and foremost, I would like to express my sincere gratitude to my supervisors, Dr. Lee Chei Sian, and Dr. Sin Sei Ching Joanna, for their guidance and mentorship over the past few years. Thanks to them for taking me under their wing and teaching me more than I could have ever asked for. They guided me through this PhD journey and inspired me to improve myself through hard work and self-discipline. I deeply appreciate their patience and encouragement, especially during some difficult and stressful time. This thesis would not have been completed without their invaluable instruction and support. It is their expert guidance and constructive suggestions that contributed to every progress I have made in this PhD journey. It is fortunate for me to work with them and learn from them in the past few years.

Second, my sincere thanks go to the examiners of my thesis and my oral defence panel. Their detailed and insightful comments and suggestions have contributed substantially to the refinement of this thesis. I would also like to thank many professors and administrative staffs at Wee Kim Wee School of Communication and Information for their help and support during my PhD study.

Third, thanks to my batchmates, officemates, and many senior PhD students for their friendship, as well as their intellectual and emotional support. I also sincerely appreciate many friends who helped me in recruiting research participants. My thanks also go to all participants for taking their time to help with my data collection.

Last but not least, I am deeply indebted to my family for their love and support. To my dear parents and extended family in China, I would like to express my gratitude in Chinese. 感谢一直呵护我成长的父母对我无私的爱和谆谆教诲。虽然你们一直希望最爱的女儿留在自己的身边，但是依然支持我出国求学的人生选择和追求自己的人生理想，并在精神和物质上竭力给予我最大的支持和鼓励。父母的爱是我人生的基石，女儿永远感激你们。在这里，也很感谢很多其他家人对我一直以来的关心和鼓励。To my dear husband, John, thank you for being there with me in this PhD journey and taking good care of me. I count myself very lucky for having you by my side. Your love gives my life an extra dimension. Thank you for having confidence in my abilities and supporting me in my endeavors to become a better self. To my family-in-law, I deeply appreciate all your love, support, and encouragement along the way, which are much more than I ever expected.

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ABSTRACT

Despite the usefulness of social media in formal education, there are concerns regarding how students can well manage their learning and use social media properly. The concerns are especially salient in the voluntary context, in which social media use is not intended by the instructor for course-related activities and students have the autonomy to select and use social media for course-related learning. Self-regulated learning (SRL) is regarded as a critical component of effective learning with social media, yet research in the voluntary context is lacking.

The goal of this research is to shed light on the extent to which students engage in SRL strategies to manage their learning when voluntarily using social media for formal learning, as well as the influential factors and effects of such behaviors. To achieve this research goal, this research draws on the perspective of social cognitive theory, supplemented by the literature on technology affordances, and proposes four research questions: 1) What are the SRL strategies that students use when voluntarily using social media to support formal learning? 2) What are the personal factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning? 3) What are the environmental factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning? 4) What are the effects of using SRL strategies on learning satisfaction when students voluntarily using social media to support formal learning?

To address the research questions, three interrelated studies were carried out in sequence. Firstly, Study 1 examined the relationships between two categories of personal factors, the use of specific SRL strategies, and learning satisfaction in the context of voluntary use of social media for formal learning. The hypotheses in Study 1 were empirically tested by analyzing survey data gathered from 192 university students. The results of Study 1 identified four types of SRL strategies: goal setting, environment structuring, performance control, and self-evaluation. In particular, the use of goal setting strategy was found to be influenced by intrinsic goal orientation, social media self-efficacy, and attitude

towards using social media for learning. In addition, the use of environment structuring strategies was found to be influenced by self-efficacy for learning, learning outcome expectations for social media, and attitude towards using social media for learning. Next, the extent of using performance control strategies was found to be influenced by intrinsic goal orientation, social media self-efficacy, learning outcome expectations, and attitude towards using social media for learning. Moreover, the use of self-evaluation strategies was influenced by social media self-efficacy, learning outcome expectations, and attitude. Last but not least, the four SRL strategies were also found to be positively associated with students' learning satisfaction in the context of voluntary use of social media for formal learning in school.

Subsequently, Study 2 was conducted to gain a more comprehensive understanding of SRL strategies students use in the context of voluntary use of social media for formal learning, and to explore the social media affordances as potential environmental factors that may influence the extent to which students engage in SRL strategies. Data from 41 university students formed into six focus groups were utilized to explore and identify the SRL strategies and social media affordances. The findings uncovered that the SRL strategies that students used could be grouped into two categories, i.e., regulation of learning and regulation of social media environment. In addition, there were two categories of social media affordances perceived by students in the social media learning environment, i.e., individualized social media affordances and shared social media affordances.

Finally, Study 3 was conducted. The aim of Study 3 was to propose and test an integrated model depicting how the personal factors (derived from Study 1) and the environmental factors (derived from Study 2) influence students' use of SRL strategies (as identified in Study 1 and Study 2), as well as the effects of using these strategies on learning satisfaction with social media. A survey study was conducted, with a total of 385 valid responses from university students. The results of structural equation modeling empirically validated that the model fits well with the data. Regarding the regulation of learning, two personal factors, i.e., self-efficacy and intrinsic goal orientation, and an environmental factor in social

media, i.e., interactivity affordance, were significantly associated with the extent to which students engage in regulation of learning. Regarding the regulation of social media environment, it is found that three personal factors, i.e., task value, social media self-efficacy, and attitude toward using social media for learning, and two environmental factors in social media, i.e., affordances of manageability and group association, could significantly influence the extent to which students engage in regulation of social media environment. Further, both regulation of learning and regulation of social media environment were identified to be significantly associated with learning satisfaction in the context of voluntarily using social media for formal learning.

For researchers, the present research provides a conceptual model grounded in the social cognitive theory, supplemented by the affordances approach, to advance the understanding of people' use of SRL strategies in the context of voluntary use of social media for formal learning, as well as the influential factors and effects of such behaviors. For practitioners, the findings from this doctoral thesis provide implications for individual learners, educational policymakers, online education industry, and government on the role of SRL in promoting lifelong learning.

CHAPTER ONE INTRODUCTION

1.1 Background

Social media can be broadly described as a group of Internet-based applications that allow users to create, edit, evaluate, and/or connect to content or to other users (Kaplan & Haenlein, 2010; Majchrzak, Faraj, Kane, & Azad, 2013). Social media platforms, such as Facebook, YouTube, Snapchat, Instagram, Wikipedia, and Twitter, have been flourishing in the recent decade. The report of social media use by *Pew Research Center* (Smith & Anderson, 2018) showed that about 73% of American adults used at least one social media platform, with a median of three sites. In particular, the median for younger users in the 18-29 age group was four, indicating the use of a greater variety of social media. These statistics suggest the increasing use of multiple social media platforms, especially among the younger generations. Similar trends of social media use have also been observed globally (e.g., Boczkowski, Matassi, & Mitchelstein, 2018; Zhao et al. 2018).

Along with the pervasiveness of social media in everyday life, the adoption and adaptation of social media for formal learning has been widely proposed and documented in recent years (e.g., Greenhow & Lewin, 2016; Huang, 2018; Zhou, Lee, & Sin, 2017). Formal learning refers to learning that is structurally designed and supported by an educational institution, with grades, educational degrees, and/or certifications as learning results (Dabbagh & Kitsantas, 2012; Selwyn, 2007). The learning objectives, schedule, and content in the formal learning context are predetermined and controlled by the course instructor (Manca & Ranieri, 2016). Undoubtedly, learning management systems (e.g., Moodle, Blackboard) are still the main online technological means to support curricular activities in many educational institutions. Learning technology innovations such as MOOCs also tend to achieve a massive scale of formal online learning by using technologies to augment conventional face-to-face teaching and learning with video recordings of lectures (Hood et al., 2015; Ma & Lee, 2018). Despite the proliferation of such dedicated learning online platforms, the advantages of social media platforms have been acknowledged by educators and scholars. Specifically, social media affords convenient access to information seeking and

sharing beyond the content available within the classroom, facilitating communication among users in globally diverse networks, and enhancing the learning experience in a social learning environment (e.g., Jalali, Sherbino, Frank, & Sutherland, 2015; Robertson, 2011; Tess, 2013). More specifically, the educational value of social media can also be leveraged to supplement and complement the use of traditional learning management systems in course instruction. Moreover, social media can be efficient and effective methods to enable learners to keep up-to-date with new knowledge (Kind & Evans, 2015). Accordingly, educators in formal education, especially in the higher education sector, have kept pace with the trends in technological advances and tapped into the potential of social media to enhance teaching effects and to encourage active learning for students (Greenhow & Lewin, 2016; Manca & Ranieri, 2016).

Much of the research attention has been paid to the mandatory use of social media in formal education (e.g., Greenhow & Lewin, 2016; Jalali et al., 2015). Namely, the adoption of social media is a mandate from course instructors and a requirement of a course. Specifically, studies in mandatory use have been mostly concerned about the functions and pedagogical use of social media, the impact of social media on teaching, and how to integrate social media into the classroom (e.g., Dabbagh & Kitsantas, 2012; Huang, 2018). On the other hand, recent work has highlighted that students tend to use various social media voluntarily for formal learning. For example, with a wide array of social media available, it is common that students voluntarily select and use social media to support course-related activities, such as communicating with peer students on collaborative projects (Manca & Ranieri, 2016), engaging in active searching for useful content that can supplement learning in the classroom (Kind & Evans, 2015), and even incidentally getting inspirations on course-related topic from other online users (Greenhow & Lewin, 2016). Voluntary use of social media for formal learning is natural, as the students have accessibility and familiarity with these technologies and already spend most of their time inhabiting in the online world (Giunchiglia et al., 2018).

Different from mandatory-use context, in which social media use is intended by the course instructor, voluntary use of social media is student-driven and bottom-up (Dabbagh & Kitsantas, 2012). That is, in the voluntary settings,

students have the right and autonomy to decide what to learn and how to use social media to support their formal course learning. Scholars have stressed that the learning activities in the voluntary context can increase the students' learning motivation and engagement (Greenhow & Lewin, 2016; Manca & Ranieri, 2016). In this vein, the phenomenon of voluntary use of social media for formal learning appears to be a significant and valuable part of the education landscape, yet research in this area is still lacking.

At the same time, there are concerns regarding whether students engage in active learning and effectively manage their learning process with social media, due to the high degree of learning autonomy required when learning with these technologies (Dabbagh & Kitsantas, 2012; Guinchiglia et al., 2018; Matzat & Vrieling, 2015). This is especially salient in the voluntary context, where individual students have relatively more autonomy and less or no guidance from the teacher regarding what to learn through social media, as well as how to appropriately choose and use various social media for learning. Students who are not able to manage their learning well may easily get distracted by social activities in social media and even quit from learning, resulting in decreased learning motivation and dissatisfaction with the learning experience (Wu, 2015). Thus, self-regulated learning (SRL), which refers to an active learning process that students use deliberate actions to manage the learning process in order to achieve learning goals, is regarded as a critical component of effective learning with technologies such as social media (Dabbagh & Kitsantas, 2012).

The central idea underlying SRL is the use of learning strategies to manage the learning process. SRL strategies refer to the deliberate actions that individuals employ to direct, monitor, and regulate learning to achieve their goals (Zimmerman & Pons, 1986; Zimmerman, 2008). Prior research on online learning has reported that students' engagement in using SRL strategies could lead to positive educational outcomes such as higher course grades (e.g., Barnard, Lan, To, Paton, & Lai, 2009; Broadbent & Poon, 2015), satisfaction with online learning experience (e.g., Artino, 2007), and continuous enrolment in other online courses (e.g., Puzziferro, 2008). It is therefore important for students to employ SRL strategies to manage their learning with social media in the voluntary context to attain desirable learning goals (Matzat & Vrieling, 2015).

However, little work to date has examined students' use of SRL strategies when voluntarily using social media for formal learning. The voluntary context needs research attention, as using SRL strategies has been highlighted as a critical lifelong learning skill when students move beyond structured academic environments (Kind & Evans, 2015). In a fast-changing learning environment with rapid emergence and update of new technologies and new knowledge, the ability to employ SRL strategies when engaging in learning with technologies can be the key skill for successful lifelong learning (Väljataga, Pata, & Tammets, 2011). Thus, this study is timely because it aims to investigate how student use SRL strategies when learning with social media in the voluntary context, the factors that may influence the extent to which student use the SRL strategies, and the effects of such behaviors.

1.2 The Role of Using Self-Regulated Learning Strategies

Self-regulated learning (SRL) is defined as *“an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment”* (Pintrich, 2000, p. 453). Using SRL strategies can help students achieve effective learning through aiding cognition, controlling effort and time, and directing learning actions (Pressley & McCormick, 1995). That is, the SRL strategies are used to assist learners in acquiring and retaining knowledge in a structured and methodological way (Zimmerman, 1989). The use of SRL strategies is essential to foster active engagement in learning and result in satisfactory learning outcomes (Zimmerman & Martinez-Pons, 1988). Earlier studies in the traditional academic context have identified a consistent positive relationship between the use of SRL strategies and academic achievements (e.g., Zimmerman & Pons, 1986; Zimmerman, 1989). Later research in the online learning contexts also revealed that students' use of SRL strategies not only influenced their academic achievement (e.g., Barnard et al., 2010; Broadbent & Poon, 2015), but also predicted their satisfactory learning experience and continuous intention to enroll in future online courses (Artino, 2007). In these studies, SRL strategies, in terms

of goal setting, environment structuring, time management, help seeking, task strategies, and self-evaluation are found to be salient in the learning process.

During voluntarily use of social media, students have the freedom to choose and use social media to compensate for their formal learning in school (Greenhow & Lewin, 2016). Compared to mandatory use of social media as part of formal course design and requirements, voluntary use of social media empowers students with more autonomy and control over their social media selection and use, as well as their learning activities. That is, with all the instruments, materials, and human resources offered by social media, students could construct a learning environment by themselves according to their preferences and learning needs. Regarding a learning context with high autonomy, educational scholars have stressed that learners must be capable of using self-regulated learning strategies to manage their learning effectively (e.g., Dabbagh & Kitsantas, 2005; Schunk & Zimmerman, 1997). To ensure effective learning with social media, it is thus important that students use SRL strategies to manage the autonomy and control in the voluntary context.

In a separate but related stream of work, research on social media use in education has discussed the pedagogical affordances of social media that can support and foster student self-regulated learning in a synergistic and interdependent way. For example, Dabbagh and Kitsantas (2012) discussed how different social media tools (e.g., blogs, wikis, YouTube, social networking sites) could support the use of SRL strategies through the affordances of personal information management (e.g., personal libraries and personal profiles), social interaction and collaboration (e.g., commenting and sharing), and information aggregation and management (e.g., bookmarks and archives). Kitsantas (2013) also suggested that students' engagement in SRL strategies, such as goal setting, time management, and self-evaluation, could be supported by using blogs and wikis, whereas social networking sites could enhance help-seeking and self-evaluation strategies. However, it is unclear whether, or to what extent, the SRL strategies uncovered in prior research, such as goal setting, environment structuring, time management, help seeking, task strategies, and self-evaluation, are actually used by students when learning with social media, especially in the voluntary context where learning activities and social media use are not

instructor-led. The influential factors and effects of such behaviors also remain unexplored.

In addition, when learning with social media in the voluntary context, the learning content and instructional support are not predetermined as in the mandatory context. The boundary between learning activities and social activities is also relatively blurred when learning with social media (Greenhow & Lewin, 2016). In this vein, it is possible that students may engage in other new SRL strategies to manage their learning with social media in the voluntary context. For example, without the guidance of the instructor, students need to search and decide which information in social media are credible for them to use as learning resources (Manca & Ranieri, 2016). However, these new SRL strategies are less explored in the context of voluntarily using these social media for formal learning, and their influential factors and effects are not well understood. Hence, it is needed to have a comprehensive understanding of how students employ SRL strategies in the context of voluntary use of social media for formal learning.

1.3 Theoretical Framework

This study draws on the social cognitive theory, supplemented by the literature on social media affordances, to explicate how students use SRL strategies in the context of voluntary use of social media for formal learning, as well as the influential factors and effect of such behaviors.

1.3.1 The Social Cognitive Theory

Social cognitive theory is used as the theoretical basis to explore the influential factors and effects of using SRL strategies. This theoretical perspective is a psychological model of behavior that was primarily proposed by Albert Bandura (1986) to explain human behavior as a triadic reciprocal causation. As shown in Figure 1.1, personal, environmental, and behavioral determinants interact influence each other in a bidirectional way (Bandura, 2001b). In essence, it posits that both personal factors and environmental factors can shape and control human behavior, which in turn may also exert influence on people's internal dispositions and the external environment (Bandura, 1986; Pintrich & Schunk, 2002).

Figure 1.1 The triadic reciprocal causation in social cognitive theory (Bandura, 2001b)

Drawing from the social cognitive perspective, Zimmerman (1989, 1990, 2008) formulated SRL as a learning process in which personal factors, environment, and the behavior reciprocally interact to achieve academic success. In particular, the social cognitive perspective of SRL highlights the role of human agency and posits that the extent to which students use SRL strategies may vary, depending on personal factors and environmental factors (Pintrich, 2000; Zimmerman, 2000). Personal factors in the social cognitive model refer to the motivational beliefs of a learner, such as self-efficacy and intrinsic goal orientation (Wolters, Yu, & Pintrich, 1996). Environmental factors refer to the events in the learning environment that students observe and make sense of. Moreover, due to the reciprocal interaction, a learner's perceptions, such as learning satisfaction, can also be influenced by the learning behavior (Bandura, 1986; Zimmerman, 1989). Therefore, social cognitive theory can be the theoretical framework for this study and guide the investigation of the influential factors and effects of using SRL strategies when students voluntarily use social media for formal learning.

Multiple studies have indicated that personal factors related to learning can influence their engagement in using SRL strategies in the process of learning. For example, in Artino's (2007) review of studies into SRL in online course learning, task value and self-efficacy for learning were significant predictors of students' use of SRL strategies. Task value refers to a student's judgment of how interesting, useful, and important a learning task is, while self-efficacy for

learning is a student's belief of his/her competency to complete the course. In online workplace training, Wan, Compeau, and Haggerty (2012) also found that people's intrinsic goal orientation of taking online training is closely related to personal SRL strategies use. Cho and Heron (2015) investigated the role of intrinsic goal orientation, task value, and self-efficacy for learning in a remedial online mathematics course and found that these personal factors were positively associated with their use of learning strategies such as metacognitive self-regulation and critical thinking. As the goal of voluntary use of social media for learning is to support formal learning, these personal factors related to learning may exert influence on their use of SRL strategies to manage their learning in social media. Hence, research should examine whether personal factors related to learning may be related to students' use of SRL strategies when voluntarily using social media to support formal learning.

In addition to personal factors related to learning, in a learning context mediated by technologies like social media, learning resources distribution and social interactions relied on information technologies to occur. Bandura (2001a) posits that with the increasing complexity of technology, technological competence is required for individuals to be successful in a technology-mediated environment. Such technological competence is shaped by individuals' attitudes, perceptions, and experience towards the use of the technology. In this vein, prior studies into online learning have revealed that personal factors related to technology use (i.e., self-efficacy, outcome expectations, and attitudes) may also exert influence on people's online learning and technology use (e.g., Compeau, Higgins, & Huff, 1999; Tsai, Chuang, Liang, & Tsai, 2011). Taken together, research on online learning and technology use has suggested a valuable set of personal factors that may also be influential in the context of students' voluntary use of social media to support formal learning.

Further, social cognitive theory posits the reciprocal interaction among personal, environmental, and behavioral determinant. Informed by this, personal affective perceptions, such as learning satisfaction, can also be influenced by behavioral performance (Bandura, 1986; Zimmerman, 1989). Studies in online learning have revealed the positive effects of using SRL strategies on a student's learning experience (Artino, 2007; Kuo, Walker, Schroder, & Belland, 2014).

For example, Artino (2007) found that students with greater use of SRL strategies were more satisfied with their online learning experience, which in turn improved continuing motivation in enrolling in online courses in the future. In this vein, learning satisfaction, which reflects students' evaluation of their learning experience, has been considered an important indicant of a successful online learning program (Kuo, Walker, Belland, & Schroder, 2013; Puzziferro, 2008). Moreover, students' learning satisfaction may also lead to higher persistence, greater commitment to learning, and lower drop-out rates (Joo, Lim, & Kim, 2011; Liaw, 2008). Given these potential benefits, research should investigate whether using SRL strategies can also exert influence on a student's learning satisfaction with social media.

In addition to personal factors, social cognitive theory also suggests that environmental factors, which are also determinants of individuals' behaviors, could promote or inhibit students' use of SRL strategies (Bandura, 1986; Zimmerman, 1989). In the original conceptualization, the environment often takes the form of a structured formal learning setting, where the learning environment, a classroom or an online course system, is pre-determined and controlled by the instructor. Environmental factors that influence the use of SRL strategies are resources that student can observe and perceive, such as the presence of a model, verbal persuasion, social support from others or symbolic information such as structural manuals (Zimmerman, 1989).

However, when students choose and use multiple social media available to support their formal learning, in most cases no learning model (e.g., the instructor), content, peers, learning goals, and learning tasks could be specified. That is, the learning environment is constructed by students themselves. Hence, there is an important aspect that warrants further research: the dynamic self-constructed learning environment in which students adopt and adapt multiple technologies voluntarily to support their formal learning. In this vein, environmental factors take the form of the resources offered by various social media that students can use for learning. However, still unexplored are the environmental factors in a dynamic self-constructed learning environment that can influence students' use of SRL strategies. Regarding this, the affordances

approach can help account for the environmental factors in a social media learning environment.

1.3.2 The Affordances Approach

The concept of affordances was originally defined by Gibson (1986) in the field of ecological psychology as action possibilities for animals in relation to the properties of a given environment. That is, users perceive the possible actions that an object allows them to take, instead of the properties of the object. From an affordance perspective, social media affordances reflect the possible actions that users perceive they could apply social media to their needs or purposes (Lai, 2017; Rice et al., 2017; Treem & Leonardi, 2012). The affordances approach is of great utility to understand the various ways users adopt, appropriate, and reinvent the material features of objects to accomplish tasks (Rice et al., 2017). Instead of focusing centrally on features or a particular social media platform, an affordance approach is useful in explaining why various social media are used in similar or different ways (Treem & Leonardi, 2012). That is, exploring affordances can transcend platforms or features. Therefore, the affordances of social media can help to understand the use of multiple social media technologies by students in the voluntary context.

The concept of affordance has been used to explicate the use of a set of technologies, including social media, in organizational communication research (e.g., Lai, 2017; Lee, Watson-Manheim, & Chudoba, 2014; Rice et al., 2017; Treem & Leonardi, 2012) and educational research (e.g., Dabbagh & Kitsantas, 2012; Völjätaga et al., 2011). For example, in organizational communication, the affordances approach has been shown to be effective in understanding the resources afforded by information technologies to manage the communication environment (Lee, 2010). In educational literature, affordances of social media have mainly been examined in the mandatory context to understand how social media can support and foster student self-regulated learning (Dabbagh & Kitsantas, 2012; Kitsantas, 2013). Taken together, the affordances approach helps to explicate a more dynamic form of a learning environment constructed by social media. This approach provides a useful theoretical perspective to extend

the explanatory scope of social cognitive theory in the voluntary context where multiple social media are available for students to choose and use.

1.4 Research Gaps

Research on social media use in education and self-regulated learning have gained consistent interest in recent decades, especially in the fields of education and information systems. The social cognitive theory and the affordances approach have been employed to examine people's learning behaviors and technology use. It appears that the use of SRL strategies in a technology-mediated learning environment (a behavioral determinant in the lens of social cognitive theory) can be influenced by people's motivational beliefs (personal factors in the social cognitive theory), and the technological affordances (environmental factors in the social cognitive theory). The behavior of using SRL strategies may in turn influence the educational outcomes such as learning satisfaction with the technology. *However*, three important gaps exist in existing research, warranting the investigation in the present study.

1.4.1 Inadequate Understanding of Using SRL Strategies in the Voluntary Context

The role of using SRL strategies in students' success in academic learning has long been stressed in educational research. Earlier studies in traditional classroom learning have suggested that students employ SRL strategies to foster active engagement in learning, which could lead to better academic achievement. For example, some self-regulated students set goals for their study, while others persist at a difficult task or block out distractions to enable them to perform better (Pintrich & de Groot, 1990). Research also reported that students used strategies to regulate the learning process such as setting learning goals, organizing, coding, and rehearsing information related to learning, monitoring learning performances and time, and seeking assistance when encountering problems (Zimmerman & Pons, 1986). Recent scholarly attention has been paid to online learning contexts. It suggests that the use of SRL strategies is even more important in the online contexts due to the relatively high learning autonomy and lack of physical presence of instructors and peer students (Barnard et al, 2010; Broadbent & Poon,

2015). Online learning research has found that using SRL strategies, such as goal setting, environment structuring, and help seeking, were related to students' satisfaction with an online course and intention to take online courses in the future (e.g., Kuo, Walker, Schroder, & Belland, 2014; Puzziferro, 2008). However, in terms of learning with social media, in spite of its increasing adoption in formal education, there has been very limited work done on students' use of SRL strategies and learning experience.

Among the few studies that have begun to address the concept of SRL in the educational context involving social media use, much of the research has centered on the mandatory use context. That is, the adoption of social media is a mandate from the course instructors and a requirement for the course (Greenhow & Lewin, 2016; Jalali et al., 2015). Specifically, past studies are mostly concerned about the utility and learning enables students to have the freedom to decide what to learn and what social media to use for learning (Greenhow & Lewin, 2016). It thus calls into question whether the same types of SRL strategies uncovered in prior research are also employed in the voluntary context and whether other forms of SRL strategies are being overlooked.

Further, the extent to which students engage in SRL strategies has been found to play a significant role in influencing a student's learning experience in terms of satisfaction (Artino, 2007; You & Kang, 2014). However, to the best of knowledge, no study has examined the effects of using SRL strategies on learning satisfaction in the context of voluntary use of social media for formal learning. Satisfaction as a learning outcome can be worthy of investigation because it can be associated with learning quality, knowledge retention, as well as students' continuous intention to make use of social media for future learning in school or for lifelong learning (Cho & Heron, 2015; Joo et al., 2011; Kuo et al., 2013). In this light, it is necessary to examine how the use of SRL strategies, in the context of voluntary use of social media for formal learning, can be associated with individuals' learning satisfaction.

1.4.2 Lack of Investigation into the Combined Influences of Personal Factors

The social cognitive perspective highlights the importance of personal factors in shaping human behaviors (Zimmerman, 2002). Personal factors in the social cognitive theory refer to the motivational beliefs of a person. Research relevant to learning with social media can be grouped into two streams. One stream includes work that focuses on the influence of personal factors related to learning, namely, a student's motivational beliefs of what they learn; the other stream includes works that examine the influence of personal factors related to technology use, namely, a student's motivational beliefs of using the technology.

Research on online learning has focused on the structural online course learning and the students' engagement in a course. It is found that the extent to which students use SRL strategies when taking an online course depends on the individuals' motivational beliefs related to what they learn (i.e., the course), such as their self-efficacy for performing well on the task, intrinsic goal orientation, and task value (Artino, 2007; Broadbent & Poon, 2015). These personal factors can be categorized as personal factors related to learning. However, some scholars have also suggested that only evaluating the personal factors related to learning may not be enough to capture the possible personal influences that might be important for self-regulated learning in the learning context of voluntary use of social media (Bandura, 2002; Zimmerman, 2008).

In a learning context mediated by technology like social media, the motivational beliefs are not only about what students need to learn, but also about their use of technologies that support the learning. Studies into technology use also revealed the influence of personal factors related to technology use, such as technology self-efficacy, outcome expectations, and attitude, on people's technology adoption and usage (e.g., Compeau, Higgins, & Huff, 1999; Tsai, Chuang, Liang, & Tsai, 2011; Yang & Chang, 2012). In this vein, personal factors related to technology use may exert influence on a student's learning behaviors when using social media.

Compared to mandatory use of social media as part of course design and requirements, voluntary use of social media empowers students with autonomy

and control over not only their learning, but also social media selection and use. In particular, individual learners rely on various information and communication technologies for information seeking and building virtual social networks to engage in knowledge exchange, collaborative learning, and problem solving (Dabbagh & Kitsantas, 2012; Kop, 2012). In this vein, students need to be capable and motivated to engage in what they need to learn (i.e., a course in formal education), and also need to be capable and motivated to use social media to construct a learning environment for their learning needs. It thus seems necessary to consider both personal factors related to learning and personal factors related to social media to explain students' SRL behaviors in the voluntary context. Still lacking, however, is an investigation on the combined influences of these two categories of personal factors, i.e., personal factors related to learning and personal factors related to social media use, which are both relevant to learning with social media in the voluntary context. The combination of these two categories of personal factors may explain more variance of the extent to which students use SRL strategies in this context.

1.4.3 Less Consideration of a Learning Environment with Multiple Social Media Available

Online learning research on self-regulated learning has been largely conducted in the context in which a single online learning system was used in a mandatory way (e.g., Puzziferro, 2008; Whipp & Chiarelli, 2004). The focus of this research is to understand how students engage in SRL strategies on a single learning platform (e.g., Azevedo, Moos, Greene, Winters, & Cromley, 2008), and how the variances of the extent to which students use of SRL strategies and the variances of learning outcomes could be attributed to individual differences. For example, some studies examined how personal factors related to Internet use may influence SRL (e.g., Moos & Azevedo, 2009). As in those studies, the use of an online learning system was mandatory and learning activities were instructor-led, an implicit assumption was that the students were using the same learning technology when performing learning tasks assigned by the instructor. Scant attention is paid to the possibility that a wide array of new technologies are available for students to choose and use voluntarily to support their formal learning.

The concept of affordance has been used to explicate the use of a set of technologies, including social media, in the context of organizational communication (e.g., Lee, Watson-Manheim, & Chudoba, 2014; Rice et al., 2017; Treem & Leonardi, 2012) and educational use of technologies (e.g., Dabbagh & Kitsantas, 2012; Väljataga, Pata, & Tammets; 2010). Instead of focusing on features or a particular social media platform, an affordance lens is useful to understand how students use different social media in similar ways or the same social media in different ways (Treem & Leonardi, 2012). A few studies have examined social media affordances and the use of SRL strategies, but mainly in the context of mandatory use of social media for formal learning. For example, Dabbagh and Kitsantas (2012) developed a pedagogical framework of social media affordances, which suggested that instructors could guide students to use various social media to support management of personal information, interaction and collaboration with other students, and aggregation and management of information. However, different from the mandatory use context, student may have different perceptions of social media affordances for learning in the voluntary context. This is because the adoption and usage of social media in the mandatory context is only related to the learning tasks assigned by the instructor, while learning purposes in the voluntary context is student-initiated and student-led (Greenhow & Lewin, 2016). The latest *Pew Research* (Smith & Anderson, 2018) has suggested that individuals, the younger generation in particular, had the tendency to use a mix of social media platforms in personal life and there was a substantial overlap between the users of various social media. For example, about 73% of Twitter users and 77% of Snapchat users also indicated themselves as Instagram users. Similarly, in the voluntary context, it is possible that students use an array of social media technologies such as Facebook, YouTube, and WhatsApp to supplement their formal learning, albeit with different learning purposes (Greenhow & Lewin, 2016). Yet, there does not exist a comprehensive set of social media affordances that could help understand how students make sense of available resources afforded by various social media and use them for learning in the voluntary context. Also unknown is how a student's perception of social media affordances can be related to the extent to which they engage in SRL strategies.

1.5 Research Goal, Questions, Objectives, and Methodology

Informed by the problem statement and research gaps, the research goal is to understand how students use SRL strategies when voluntarily using social media for formal learning. In particular, the present research aims to explore the extent to which students use SRL strategies in the context of voluntary use of social media for formal learning, as well as the influential factors and effects of such behaviors. For this purpose, it draws on social cognitive theory, supplemented by the literature on technology affordances. The social cognitive theory guides the overall theoretical framework of this study, which posits that both personal factors and the environment can influence behavior and the behavior can in turn affect personal perceptions (Bandura, 1986). The affordances approach supplements the social cognitive perspective by informing social media affordances as environmental factors.

To address the research gaps discussed in Section 1.4, four research questions (RQs) are formulated to accomplish the research goal:

RQ1: What are the SRL strategies that students use when voluntarily using social media to support formal learning?

RQ2: What are the personal factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning?

RQ3: What are the environmental factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning?

RQ4: What are the effects of SRL strategies on learning satisfaction when students voluntarily using social media to support formal learning?

To address the research questions and accomplish the research goal, the present research consists of three interrelated studies, which were conducted in sequence.

In Study 1, the RQ1, RQ2, and RQ4 are partially addressed. Study 1 mainly attempts to address the research gap discussed in Section 1.4.1 regarding the inadequate understanding of using SRL strategies and Section 1.4.2 regarding the lack of investigation into the combined influences personal factors uncovered in

the research related to social cognitive theory. In particular, Study 1 includes a literature review of prior studies on online learning and technology use to identify the influential personal factors and SRL strategies. The research objectives (RO) of Study 1 are three-fold:

RO 1.1: To test whether the SRL strategies uncovered in prior research are also used by students when they voluntarily use social media for formal learning.

RO 1.2: To test whether two categories of personal factors identified in prior research, namely, personal factors related to learning and personal factors related to social media use, are related to the extent to which students use SRL strategies when they voluntarily use social media for formal learning.

RO 1.3: To test whether the relationship of using SRL strategies and learning satisfaction is significant in the context of voluntary use of social media for formal learning.

As the objectives of Study 1 focus on relating findings in prior research to the context of voluntary use of social media for formal learning and test the relationships between constructs, a quantitative survey study was carried out to accomplish the research objectives. To empirically test the hypotheses, self-reported survey data was collected from 192 university students who have the experience of using social media voluntarily for formal learning. Hierarchical regression was employed to examine the hypothesized relationships.

In study 2, the remaining part of RQ1 and RQ3 are addressed. In particular, Study 2 seeks to address the research gaps discussed in Section 1.4.1 regarding the unexamined SRL strategies and Section 1.4.3 regarding the lack of research on a learning environment with multiple social media available. Investigation of the environmental factors is informed by literature on the affordances approach. Thus, the research objectives of Study 2 are two-fold:

RO 2.1: To verify SRL strategies in study 1 and to explore whether there are other SRL strategies that deal with social media use for learning in the voluntary context.

RO 2.2: To explore the social media affordances that students perceive when using social media voluntarily for formal learning.

As these research objectives are exploratory, a qualitative focus groups study was conducted in Study 2. A total of 41 university students joined six different focus group sessions, ranging from 5 to 8 participants each. Participants shared their experience of using social media voluntarily for course study in school and discussed how they perceived the affordances of social media use for formal learning in the voluntary context and their actual use of SRL strategies in this context. To identify the prominent social media affordances for learning in the voluntary contexts and prominent strategies students employed to regulate their learning in this context, data collected from focus group discussion were analyzed using content analysis, with pre-determined codes as well as new codes emerged from inductive coding (Hsieh & Shannon, 2005).

In Study 3, an integrated conceptual model building on the findings in Study 1 and Study 2 was proposed and tested, addressing all RQs proposed earlier. Drawing on the social cognitive perspective, supplemented by the affordances approach, this model intends to explicate the relationships among personal factors, social media affordances, the use of SRL strategies, and learning satisfaction in the context of voluntary use of social media for formal learning. In particular, the research objective of Study 3 is:

RO 3: To test an integrated model depicting how the personal factors (as identified in Study 1) and the environmental factors (as uncovered in Study 2) can work together to influence students' use of SRL strategies (as identified in Study 1 and Study 2) in the context of voluntary use of social media for formal learning, as well as the effects of using these strategies on their learning satisfaction with social media.

As this objective is to test relationships between constructs in a conceptual model, Study 3 employed a quantitative survey approach to gather data and test the model. When designing the questionnaire, qualitative data in Study 2 was used to refine survey items in Study 1 and to develop items for new constructs in Study 3. A total of 385 valid responses from university students were used for data analysis. To test the fit of empirical data to the model, the structural equation modeling (SEM) method was used for model testing. Figure 1.2 offers an overview of this research.

Figure 1.2 Research overview

1.6 Potential Contributions

1.6.1 Potential Theoretical Contributions

This research has potential contributions to the existing field of social media use in education in the following ways. First, this study explicates how students engage in SRL strategies students use in the context of voluntary use of social media for formal learning, which extends the understanding of students' learning behaviors with the use of social media in the voluntary context. This study does so by integrating social cognitive theory with affordances approach, thus providing an integrated analysis of how personal factors related to learning and technology use and the social media affordances influence the extent to which student use SRL strategies, and how the use of these strategies influences learning satisfaction with social media in the voluntary context.

Second, unlike existing research on the adoption of a particular learning technology in education settings, this study considers a broader set of social media available in the voluntary context that students can choose and use. Scholars in education have argued that the myriad social media technologies could not only support personal learning by providing students with accessible learning tools, but also engage students in social learning with a broader learning network (Greenhow & Lewin, 2016). Through the lens of social media affordances, this study provides a dynamic picture of how students build on multiple social media to support formal learning in the voluntary context. As using SRL strategies is crucial to achieve effective learning, this study also provides insights into the effects of social media affordances on student's learning behaviors in terms of using SRL strategies. The findings can extend scholarship examining social media affordances in learning contexts more broadly.

1.6.2 Potential Practical Contributions

This study can also offer practical implications for integrating social media in formal education as well as lifelong learning. Firstly, for teachers, policymakers, and other stakeholders in education, this study can help them understand what makes students differ in their use of SRL strategies when learning with social media to support formal learning in the voluntary context.

To prepare students to become independent learners, there is a need to provide students with knowledge and practice in selecting and integrating available social media tools for learning purposes, as well as self-regulate the learning process in the voluntary context. Findings of this study, i.e., the influential factors and effects of students' use of SRL strategies, can provide implications for the development of instruction and training programs that help the students who are less self-regulated when using social media for learning in the voluntary context.

Second, for students, this research can also help them to understand what factors may contribute to their use of SRL strategies when voluntarily using social media to meet their learning needs. Learning is a lifelong process and the ability to use SRL strategies is deemed as a key lifelong learning skill (Severino, Aiello, Cascio, Ficarra, & Messina, 2011). When students move beyond the institution-based formal learning context, they will need to identify their knowledge gaps and solve problems in life and work. As social media usage has been stressed as a key way of lifelong learning in today's information age (Kind & Evans, 2015), this research will inform students about the potential of social media to support their effective acquisition of knowledge and skills.

1.7 Thesis Outline

The structure of this thesis is presented in Figure 1.3, including six chapters.

Chapter One has introduced the research background of social media use in formal education and the research problem posed by the concerns of whether students can well manage their learning and social media use in the voluntary context. It highlighted the role of using self-regulated learning (SRL) strategies to manage learning with social media in the voluntary context and identified the three research gaps in existing theory and research. It also presented the research goal, questions, objectives and methodology, as well as potential contributions to research and practice.

Chapter Two reviews the literature relevant to the current study. In particular, it begins with a discussion of the phenomenon of using social media for formal learning, followed by a more focused discussion of the voluntary use

context. It also presents a review of research related to self-regulated learning, social cognitive theory, the affordances approach, and learning satisfaction.

Chapter Three presents Study 1, which was conducted to investigate the influences of two categories of personal factors, personal factors related to learning and personal factors related to social media use, on the use of SRL strategies, and the effects of using SRL strategies on learning satisfaction. This chapter elaborates on the proposed hypotheses and the survey study that was conducted to collect data and test the hypotheses. It also reports the results and discussion of the findings. Thereafter, implications and limitations are also discussed.

Chapter Four presents Study 2, which was conducted to uncover the social media affordances and other SRL strategies students used in the voluntary context. This chapter begins with an introduction of social media affordances and strategies that students use to regulate the use of social media, followed by the proposed research questions. Next, the design of the focus group study and data collection are elaborated, followed by a report of the findings derived from content analysis, discussion of the findings, implications and limitations.

Chapter Five presents Study 3, which was conducted to test an integrated model of using SRL strategies, drawing on the social cognitive theory, supplemented by the affordances approach. This chapter first elaborates on the conceptual model and the hypotheses, building on the findings in Study 1 and Study 2. Thereafter, it presents the design and administration of the survey, data analysis by SEM and findings, and the discussion of the research results.

Chapter Six summarizes the main findings of the whole research. It also discusses the implications for research and practice, the limitations of the current project, and recommendations for future work.

Figure 1.3 Organization of the chapters

CHAPTER TWO LITERATURE REVIEW

This chapter reviews the literature concerning social media as learning tools and comparisons with other online learning technologies, followed by a description of social media use for formal learning. Specifically, previous research concerning the mandatory use of social media is reviewed, through which the present study highlights the lack of research concerning the voluntary use of social media, which form the context of this research. Next, the concept of self-regulated learning (SRL) is presented, followed by a review of previous studies concerning self-regulated learning in the online context. Later, the theoretical perspective underpinning this research, namely, social cognitive theory, is articulated. Specifically, it includes a review of research that has examined SRL strategies and personal factors. In addition, as the affordances approach is employed to account for the environmental factors in a social media learning environment constructed by students in the voluntary context, relevant research on affordances is also reviewed. Finally, research concerning learning satisfaction as the learning outcome is presented. Hence, the social cognitive perspective and prominent variables examined in related research help formulate the conceptual model of the influential factors and effects of using SRL strategies.

2.1 Social Media Use for Learning

The development of information technologies such as social media have fostered the information society, in which people's access to knowledge and connections with others around the world (Kind & Evans, 2015). This section will provide a review of how social media has brought changes and new opportunities for students to engage in learning.

2.1.1 Social Media as Learning Tools

Social media refer to a group of online applications that people can use to generate and edit information and interact with other users (boyd & Ellison, 2007; Kaplan & Haenlein, 2010; Majchrzak et al., 2013). Specifically, the technological foundation of social media is the Web 2.0 technologies, while social media serve as a channel for user participation and content exchange to facilitate social

interactions. In the past few years, the adoption of social media has been increasing. By 2018, it was reported that 73% of American used at least one social media (Smith & Anderson, 2018). The popularity of social media has changed the way people communicate and collaborate in life, work, and study.

In most literature (e.g., Huang, 2018; Rice et al., 2017; Tess, 2013), the definition of social media has been defined by referring to the popular platforms that people implicitly recognize as social media. Examples of social media can be social networking sites (e.g., Facebook and LinkedIn), and multimedia sharing platforms (e.g., YouTube and Instagram). There are also platforms specializing in social bookmarking (e.g., Pinterest), collaborative knowledge sharing (e.g., Wikipedia), and blogging (e.g. WordPress and Blogger). In addition to the referential approach to defining social media, Kaplan and Haenlein (2010) distinguished social media conceptually from web 2.0 and User Generated Content, referring to social media as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (p. 61). Underlying the generalized term, they grouped applications into specific categories, including collaborative projects, blogs, content communities, social networking sites, and virtual worlds. In particular, social media like Wikipedia, Blogger, and YouTube are more about content sharing and exchange, which are different from social network sites that focus on social relations. As defined by boyd and Ellison (2007), “What makes social network sites unique is not that they allow individuals to meet strangers, but rather that they enable users to articulate and make visible their social networks” (p. 211). Virtual worlds replicate the real life and enable users to interact with others in the form of avatars (Kaplan and Haenlein, 2010). As social media platforms keep upgrading with new features and new platforms emerge rapidly nowadays, the categories that certain platforms belong to are also changing dynamically.

Given that social media enables easy accessibility to a large volume of knowledge and connections with knowledgeable users, social media can provide a myriad of learning opportunity for students (Dabbagh & Kitsantas, 2012). First, students can get knowledge contributed by diverse users in some social media platforms. In the learning management system (LMS) that have been widely used

by institutions, learner control and personalization of the learning content are often absent (Dabbagh & Kitsantas, 2012). That is, most of the learning resources and activities is under the control of the institutional administrators and the course instructors (Väljataga, Pata, & Tammets, 2011). Normally, instructors are responsible to determine the materials and deliver them to students through the online learning platforms (Wu, 2015). Unlike being a passive receiver of knowledge and instructions, social media enable the students to create and to share learning resources with other students. For example, in a study about using social media for language learning, some students found it a useful way to evaluate their language learning by producing and uploading learning videos and getting feedback from peers (Cheng & Chau, 2013). In this way, learning takes place through the interaction between the students; and learning content is generated not only by instructors, but also by self and other users.

In addition, social media can support learning by fostering social interactions and connections in collaborative communities. In a traditional classroom learning context, the learning network is limited to the teachers and classmates in a course (Lee & Lee, 2008). In social media, students can have a broad range of connections, which may not be related to offline social relationships but can be useful knowledge sources (Greenhow & Lewin, 2016). For example, in online learning communities, students can exchange knowledge with peer learners and ask questions to experts and professionals with whom they have no offline relationship (Chiu, Hsu, & Wang, 2006). Hence, social media enable learners to connect with peers and social networks out of the limitation of offline learning networks, which is not capitalized in traditional online course instruction platforms (Greenhow & Lewin, 2016).

Moreover, social media enable people to construct a personal learning space with any social media tools used in their everyday life, which makes learning on demand and lifelong learning possible (Kind & Evans, 2015). The near-ubiquitous use of social media can help learners to get access to the content, to other learners, and to the expert knowledge sources (Domizi, 2013). That is, social networking sites offer possibilities for learners who are not physically together immediate ways to reflect, report on, share and discuss with each other in a way that is similar to their everyday life (Dabbagh & Kitsantas, 2012). In

this vein, social media provide options for students to engage in learning without physical limitations.

In spite of the multiple learning opportunities and benefits that have been identified in existing research, some scholars have also raised concerns about the negative consequences of using social media as learning tools, especially in academic contexts. The first main concern is about whether students actually engage in active learning when passively receiving updates and information from social networks. A study on students' interactions with their teachers on Facebook revealed that students engaged more in reading or viewing behaviors and avoided active online behaviors like chatting or commenting (Aydin, 2014). The other study by Myers et al. (2018) investigated the use of Facebook group for surgeons to share experience and learn from others. It was found that not all users engaged in interacting with others in the online group and most of the online interactions were passive (e.g., likes), rather than active (e.g., commenting). Thus, while many studies have highlighted the role of social media in promoting active learning (Evans, 2015; Lee et al., 2017; Price et al., 2018), still unclear is an understanding of the extent to which students actually engage in active learning in social media, as well as the influential factors and effects on learning experience.

Second, the use of social media as learning tools can also be marred by the possible distractions from the social and entertaining content during the learning process with social media. This is mainly because social media are not designed specifically for learning purposes as a learning technology. Thus, the boundary between learning and social activities in social media is blurred (Greenhow & Lewin, 2016). In the study of Kirschner and Karpinski (2010), students reported the negative impact of Facebook on learning in terms of distraction and their poor time management skills, which resulted in less time on learning. Salomon et al. (2016) argued that non-academic activities in social media (e.g., social and recreational activities) could distract students from studying, undermining students' academic achievements. In terms of instant messaging, it was found that multitasking could have negative impacts on productivity, thus it should be stressed that students should employ regulatory strategies to control the overuse (Quan-Hasse, 2010).

Further, scholars have also highlighted concerns regarding the quality and credibility of learning content in social media, as the information was user-generated and most learning resources were not curated by instructors and professionals (Clifton & Mann, 2009). Regarding this, it is recommended that students should be precautious about the credibility of public materials and make sure that the content is accurate and from a credible source (Burke & Synder, 2008; Johns & Cuthrell, 2011). Some research suggested that parents and teachers should warn and guide the use of social media such as YouTube among young students (Lee et al., 2017). It is also advised that students need to practice the skills of evaluation and analysis when learning with social media (Liu, 2010).

Collectively, the literature suggests that the widespread popularity of social media by young adults make it unavoidable in learning contexts and there are merits and demerits in terms of using social media as learning tools. In spite of the concerns, social media provide many benefits and new opportunities that can support learning and lead to desirable outcomes. The easy accessibility to knowledge and convenient interaction with other users enabled by social media have made it natural for students to employ them for learning purposes (Manca & Ranieri, 2016). The usefulness of social media to support teaching and learning in formal education has been acknowledged and validated (Dabbagh & Kitsantas, 2012; Greenhow & Lewin, 2016). In this vein, it is important that the identified problems should be addressed to eliminate the risks of using social media as learning tools. The concerns about using social media as learning tools also call for more research to explore how students can achieve effective learning with new technologies such as social media.

2.1.2 Relationships with Other Online Learning Technologies

Before the use of social media becomes common in the formal education context, the increasing use of Internet technologies have made online learning a useful pedagogical approach in formal education, in addition to traditional classroom learning (Bennett, Agostinho, & Lockyer, 2015). Online learning is a web-based form of learning that makes use of online technologies to enable students to learn anytime, anywhere outside of a traditional face-to-face classroom (Allen & Seaman, 2013). Given this benefits, educational and

corporate organizations acknowledge the less cost of online learning and “anytime, anywhere” access to learning resources (Margaryan et al., 2013; Wan et al., 2012).

One kind of online learning technology that has been commonly used in formal learning by educational institutions is the Learning Management System (LMS) (Shen, Cho, Tsai, & Marra, 2013), which has been used to automate the administration, online events, performance tracking, and reporting of learning outcomes. Examples of LMS can be Moodle, BlackBoard, WebCT, Toolbook, and TopClass Server (McLoughlin & Lee, 2010). These LMSs allow for customization to meet various pedagogical needs in different educational institutions. They are some characteristics of learning technologies that can be defined as LMS. First, LMSs have applications such as discussion boards and chatting tools, which can support online instructions and communication both synchronously and asynchronously. Second, learning resources linking to other Internet sources can be developed and delivered by instructors. Third, LMSs support assignment submission, feedback provision, and online testing. Lastly, LMSs support administrative management (e.g., group assignment, course registration, course notification, etc.).

From a pedagogical perspective, some social media were used as an LMS. For example, in Wang, Woo, Quek, Yang, & Liu’s (2012) study, Facebook was used as an LMS in two courses for instructors to share learning resources, put up course announcements, organized tutorials and online discussions. Although LMS were initially designed for technology-enhanced learning pedagogies, some research argued that LMS emphasizes its usefulness as a teaching tool for teachers, instead of a learning tool for students (Dabbagh & Kitsantas, 2012; McLoughlin & Lee, 2010). That is, LMS use is under the control of the educational institutions, the course instructors and administrators. On the other hand, using social media as learning tools can be more learner-centered (Dabbagh & Kitsantas, 2012). In particular, learners can make use of a variety of social media tools available to construct a social media learning environment and engage in personal learning and social learning with peer students (Greenhow & Lewin, 2016; Väljataga et al., 2011).

The other form of online learning gets popular in recent years is the massive open online courses (MOOCs), which are produced by an increasing number of universities and educational institutions since 2002 (Margaryan, Bianco, & Littlejohn, 2015). MOOC emerges as a major advancement of higher education (Phan, McNeil, & Robin, 2016; Vu, Pattison, & Robins, 2015). “Massive” concerns the possibility of having large numbers of students in a course, and a large volume of data about online learner’s activities and performances. “Open” refers to low to free cost and the accessibility to materials for the course. As “online” courses, MOOCs can be delivered beyond the physical limitations of the traditional education institutions. Moreover, as a “course,” a MOOC is a structured course with framed times, structured resources, and pre-designed activities to achieve learning objectives designed by the course instructor.

In practice, social media have been employed as part of course design in a MOOC with the aim of facilitating learners’ mastery of the course. For example, in addition to the official MOOC web-space, de Waard et al. (2011) adopted Google Group to centralize discussions and a course wiki to function as an online syllabus. MOOC instructors also use other social media tools (e.g., Twitter and Facebook) as a part of a course to share specific contents that are related to the course teaching (e.g., Hood et al., 2015). In addition, social media is also used by learners voluntarily to supplement their course learning on MOOC platforms. For example, Salmon, Ross, Pechenkina, & Chase (2015) explored how social media could be used as part of a MOOC. They found that participants voluntarily joined a closed Facebook learning group and Twitter hashtag related to the course to improve their learning through communicating and connecting with other learners. In examining how learners used social media to interact with other users outside of a MOOC, Vu et al. (2015) also found that some learners tend to share and discuss the course they are taking with individuals who are part of their broader social network. Collectively, these studies suggest that the use of social media can be either mandatory or voluntary to support a MOOC.

2.2 Social Media Use for Formal Learning

Formal learning refers to learning that is supported by an educational institution and is highly structured in terms of learning content and schedule, resulting in learners receiving grades, degrees, diplomas, and certifications (Selwyn, 2007). In academic settings, such as primary, secondary and higher education, students are engaged in a systematic approach to acknowledge the specific content or materials, which are prepared and delivered by instructors of the formal learning programs.

The development of information and communication technologies has advanced formal learning in online contexts. In particular, formal educational institutions have begun to integrate learning management systems to enrich the teaching and learning experiences in formal education (Piccoli et al., 2001). In terms of social media, as they are becoming increasingly ubiquitous to the younger generation, the educational value of these tools has been highlighted by both educators and learners (Kind & Evans, 2015). In particular, social media have advantages over traditional classroom learning and learning management systems in terms of extending communication and connections outside the classroom and enhance personal and social learning. For example, studies have suggested that Facebook and wikis could help students engage in collaborative learning (Greenhow & Lewin, 2016; Franklin & Thankachan, 2013), and YouTube could help students catch up with course lectures (Jaffar, 2012). In this light, there is growing evidence that social media bring new opportunities to support formal learning (e.g., Dabbagh & Kitsantas, 2012; McGloughlin & Lee, 2010). Moreover, prior studies suggest that social media use in formal learning are either mandatory or voluntary. The contexts of mandatory and voluntary use of social media for formal learning will be elaborated in the following sections.

2.2.1 Mandatory Use of Social Media for Formal Learning

Previous research concerning social media use for formal learning mainly focused on the context where the use of social media is mandatory. That is, social media use is designed as a part of formal learning emphasized the use of social media for course activities designed by instructors. For example, a survey ($N = 8,016$) conducted by Moran, Seaman, and Tinti-Kane (2012) suggests that the use

of social media by faculty for formal teaching is increasing. About 44.1% of faculty investigated in the study integrated social media in their teaching.

Some studies examined how students can use social media to support collaborative learning in a course (e.g., Hadwin, Oshige, Gress, & Winne, 2010; Oskoz & Elola, 2011; Thomas & Akdere, 2013). For example, in Oskoz and Elola's (2011) study, wiki and chatting tools were used in a Spanish language learning course for completing a writing assignment. It was found that the collaboration and communication supported by wiki and chatting tools could improve students' foreign language writing skills. In the other study, Franklin and Thankachan (2013) investigated how graduate students participated in a problem-based learning activity through a wiki. It was found that students engaged in role-play to solve problems by making use of the collaborative nature of the wiki. Students also reported that the interaction with other peer students was more frequent than the face-to-face interaction.

Other studies consider how social media can be used for course reflections and facilitate the connections among students (e.g., Hung & Yuen, 2010; Kelm, 2011). For example, in Hung and Yuen's (2010) study, students reflected on what they have learned by posting in an online discussion forum established on Ning, an online platform for students and organizations to create custom social networks. It was found that students perceive Ning as a positive tool for learning. In particular, the features of sharing and interaction enable learners to develop feelings of social connectedness. In the other study, Kelm (2011) examined the use of blogs and sharing tools for a course program. Students were asked to post comments on other students' work, which was a learning activity designed and scheduled by the course instructor. These learning activities in social media encouraged students to be more active in self-reflection and collaboration with other students.

In addition to explore the use of social media to help students reflect their learning and facilitate peer connection, prior studies have also examined how social media could be used as a communication tools for the exchange of course-related information (Lin, Hoffman, & Borengasser, 2013; Tower, Latimer, & Hewitt, 2014). For example, in Lin et al.'s (2013) study, the instructor used Twitter to share course-related information and students were required to use

Twitter to connect and communicate with other students. It was found that students who had experience of using Twitter were more active in using Twitter for course-related activities.

Finally, some studies have also explored how social media can help students establish a personal learning space for formal learning (e.g., Bussert, Brown, & Armstrong, 2008; Dabbagh & Kitsantas, 2005; Yeo & Lee, 2013). For instance, Bussert et al. (2008) explored the use of Flickr in teaching library database. The findings suggest that using Flickr can help students construct a meaningful learning environment, which can promote experimental learning and creativity.

In summary, prior studies on social media for formal learning have examined the use of social media to support collaborative learning activities, self-reflection, peer connection, information exchange, and personal learning management in the formal learning context. It can also be noted from the research descriptions that most studies investigated how students' learning behavior when using social media for learning is designated by the instructors and the use of social media for formal learning is mandatory. Hence, mandatory use of social media for formal learning, similar to the use of other institution-based LMS, is under the control of the institution side. While these studies on mandatory use of social media were valuable and contributed to the knowledge of how social media can be useful learning tools, it is still unknown if the findings from these studies are applicable to explain learning contexts where students are relying on social media to supplement their learning (e.g. Lee et al., 2017). Specifically, in the voluntary context, individual students have relatively more autonomy and less or no guidance from the teacher regarding what to learn through social media, as well as how to choose and use various social media appropriately for learning.

2.2.2 Voluntary Use of Social Media for Formal Learning

With easy access to interactions with other users and knowledge shared by other users, existing studies have indicated that students also voluntarily make use of social media to support their formal learning (e.g., Dabbagh & Kitsantas, 2012; Greenhow & Lewin, 2016; Lee & Lehto, 2013). Voluntary use of social media for formal learning refers to a learning context in which social media use

for course-related learning is determined by students themselves. That is, social media use is not assessment-driven, not a requirement of the course design or a mandate from the instructor (Greenhow & Lewin, 2016; Wu & Lederer, 2009). During voluntarily use of social media, students are free to choose and use any social media in pursuit of knowledge or skill they are interested in (Greenhow & Lewin, 2016). A voluntary action is internally initiated by the individual, while the mandatory action is externally directed or required by the outside (Wu & Lederer, 2009).

As the younger generations have a high familiarity with new technologies, it is natural that students voluntarily use social media for educational purposes (Guinchiglia et al., 2018). For example, research reported that media sharing websites such as YouTube were also voluntarily adopted by students to connect course materials to real-life examples (Tan, 2013). Another prominent phenomenon of voluntary use of social media for formal learning is numerous student-led and student-initiated group learning activities in social network sites such as Facebook (Manca & Ranieri, 2016). As found in the study of Ebner et al. (2010), students used microblogging for course learning in school. An analysis of the tracked postings revealed that their microblogs included not only formal communication related to group work but also private informal communication, which extended course learning beyond classrooms. Clark, Logan, Luckin, Mee, & Oliver, (2009) examined students' use of social media in and out of school. Their results reveal that learners have access to a variety of social media technologies and 41% ($n = 21$) of them use social media (e.g., MSN, Facebook, MySpace, YouTube) to support schoolwork through seeking help from other users, watching tutorial videos, and joining online discussions. The researchers also concluded that students were not fully making good use of the potentials that social media have for formal learning and more training would be needed. Taken together, it has been common in the formal education context that students voluntarily use social media for course-related learning.

However, there is a lack of research looking into the voluntary-use context. In particular, even with the availability of technologies and students' desire to learn, it remains questionable about the capability of students to manage their learning well in a learning context that provides students with high autonomy and

learner control. In this vein, scholars (e.g., Dabbagh & Kitsantas, 2012; Garrison & Cleveland-Innes, 2005; Puzziferro, 2008; Zimmerman, 2005) have highlighted the importance of students' capability to use self-regulated learning strategies (SRL) to achieve learning success with technologies. In this light, the present research contends that using SRL strategies will help them optimize their learning process to achieve effective learning with social media in the voluntary context. Motivated by the lack of research in voluntary use of social media for formal learning and the benefits of using SRL strategies in a self-directed learning context, this research aims to shed light on students' engagement in SRL strategies when voluntarily using social media for formal learning.

2.3 Self-Regulated Learning

Self-regulated learning applies the general conceptualization of regulation and self-regulation to learning contexts, specifically, the formal learning contexts in educational institutions (Pintrich, 2000). Different theoretical models have been proposed to conceptualize self-regulated learning and have been applied in online formal learning research.

2.3.1 Theories and Models of Self-Regulated Learning

Self-regulated learning (SRL) refers to “an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment” (Pintrich, 2000, p. 453). Since the 1980s, there have been some theories and models developed to explain why and how learners self-regulate to achieve learning goals (Zimmerman, 2008). These theoretical models share four common assumptions underlying self-regulated learning (Pintrich, 2000). First, people are active and constructive learners in the self-regulated learning process. Second, learners have potential control over their learning process. Third, there is a standard or goal for the learning task that can guide the regulatory processes. Last, using SRL strategies mediate the influences of individual and contextual differences on learning achievement. Building on these assumptions, models of SRL have been

proposed, with different emphases on what strategies and processes are important to achieve learning objectives.

The operant models of SRL focus on behavioral dimensions of SRL (Mace & Kratchowill, 1985). In these models, reinforcement strategies are adopted in the learning process. For example, in the academic setting, students enact effective behavioral strategies that will improve academic achievement. The self-regulation is mainly about behavioral regulation such as increasing attendance and using rewards when learning goals are attained (Schunk, 2005). In these models, the use of reinforcement strategies helps individuals to achieve their goals. Put differently, self-regulated learning is a process in which individuals use strategies to react to the reinforcement from the environment until gaining desired learning objectives.

The other stream of research is based on the information processing model of self-regulated learning by Winne and Hadwin (1998), which stresses the cognitive aspect of self-regulated learning in acquiring knowledge. From this perspective, self-regulated learning involves the use of cognitive strategies and metacognitive strategies. Learners engage in rehearsal, elaboration, and organization to regulate cognition. There are also metacognitive strategies, such as making a judgement of what to learn, feeling of knowing, evaluation of content, and monitoring performance. Research in this line mainly concerns the cognitive activities when learning complex academic topics from hypermedia, in which the information is presented in a non-linear way (Azevedo, 2005). Different from operant models, the information processing model of self-regulated learning focuses on covert process (i.e., cognitive, metacognitive, and motivational strategies), rather than overt processes such as behavioral regulation. Hence, this model has been widely adopted in studies to explore how people manage their cognition when interacting with learning content presented in hypermedia (e.g., Greene, Costa, Robertson, Pan, & Deekens, 2010; Moos & Azevedo, 2008; Scheiter & Gerjets, 2007).

Different from the operant models and information processing models, the social cognitive models of SRL highlight the interrelationships among the behavior of using SRL strategies, personal factors, and the learning environment (Bandura, 1986; Pintrich, 2000; Zimmerman, 1989). In this vein, self-regulated

learning not only emphasizes covert and mental activities in terms of knowledge states and reasoning when choosing cognitive strategies to process the information acquired, but also stresses how people use SRL strategies on the base of self-belief and interaction with the environment. From a social cognitive perspective, Zimmerman (2000) described self-regulated learning as a cyclical process that includes three phases: forethought, performance, and self-reflection. In this process, people engage in various SRL strategies, which are deliberate action plans that people employ to optimize the process so that learning goals can be achieved (Zimmerman, 1989). In particular, in the first phase, i.e., the forethought phase, learners engage in goal setting and planning, which will guide their later learning process. In the second phase of performance control, learners manage the learning process through strategies such as time management, effective task strategies, and help seeking. During the last phase of the model, which is the self-reflection phase, learners evaluate their learning outcomes based on a standard or a goal. The self-evaluation in the phase may in turn influence the first phase of the model, i.e., the forethought phase. Therefore, the three phases formed a cyclic feedback loop which represents the process of self-regulated learning.

2.3.2 *SRL in Online Learning*

Research on SRL assumes that individuals in the online context have more autonomy than the classroom learning and have more responsibility for their own learning without the presence of an instructor or other learners (Lehmann, Hähnlein, & Ifenthaler, 2014; Whipp & Chiarelli, 2004; Winters, Greene, & Costich, 2008). In this vein, it is posited that the learning control has been shifted from the instructor to the learner in the online instruction contexts. With this shift, models of self-regulated learning have gained attention from researchers to understand self-regulated learning in the online environment. Several important points about these studies will be elaborated as follows.

One line of online learning research focuses on the hypermedia environment, in which learners have control of accessing information that is presented in a non-linear fashion (Scheiter & Gerjets, 2007). As learning in hypermedia mainly concerns the process of acquiring knowledge through the

interaction with content, research in this stream has mainly investigated SRL using the information processing model, which stresses the use of metacognitive and cognitive strategies to regulate learning. For example, Azevedo (2005) found that participants varied in cognitive and metacognitive processes when engaging in learning. In particular, some participants engage in SRL using metacognitive strategies to activate prior knowledge and monitor their cognitive activities, while other participants used strategies such as re-reading, notes taking, and summarizing to regulate cognitive learning. This stream of research views learning as knowledge construction through information processing that is temporally unfolded in real time (Winne & Perry, 2000). It has been concluded that self-regulated learning helps students organize and retain information and is an essential part of successful online learning (Azevedo et al., 2008). However, research on SRL in hypermedia, which is from the information processing perspective, provide little insight into an individual's overt learning behaviors, such as interacting with technology other online learners.

The other line of self-regulated learning research in online formal learning context has focused on online course learning, in which students use a learning management system for online courses and learn at their own pace. Different from research on hypermedia that only assesses self-regulated learning as a knowledge construction process (Zimmerman, 2008), most studies of online course learning investigated self-regulated learning as not only a covert process of acquiring knowledge, but also an overt process including the interactions between online learners. Research in this stream has provided evidences that a student's engagement in self-regulated learning can positively influence academic achievement and online learning satisfaction (e.g., Barnard, Lan, & Paton, 2010; Broadbent & Poon, 2015).

However, when students voluntarily use social media for formal learning, students not only get access to course content predetermined and well-structured by instructors, but also unstructured learning resources generated or shared by other users on social media. Based on the new learning opportunities brought by social media, some studies attempted to explore how social media technologies can support the use of SRL strategies in higher education. For example, based on the social cognitive model of self-regulated learning, Dabbagh and Kitsantas

(2012) proposed a pedagogical framework depicting how various social media tools could support students' self-regulated learning. Wu (2015) investigated the use of SRL strategies in social media learning contexts and revealed that both mental and behavioral self-regulatory strategies were adopted by students to keep the focus on learning. In closing, research on SRL and social media have revealed how various social media technologies can support SRL. However, these studies tend to emphasize the technological influence of social media on self-regulated learning. Less discussed are issues in terms of to what extent do learners actually engage in SRL strategies in the social media learning environment, factors that influence their engagement in SRL strategies, as well as the effects of using SRL strategies on their learning outcomes (Dabbagh & Kitsantas, 2012).

Taken together, based on previous discussion of the theories and models of self-regulated learning and their applications in the online formal learning settings, this study adopts the social cognitive perspective as a theoretical framework because the social cognitive model of SRL has been adopted as guidance in the online course learning context, in which learning is not only about information processing, but also the interaction with instructors and peer students, as well as interaction with online technologies in the learning environment. In the context of voluntary use of social media for formal learning, although social media use is voluntary, learning is driven by a formal course and the learning process also involves interactions with other users and social media technologies in the learning environment. Accordingly, the social cognitive perspective of SRL, which addresses the reciprocal interaction between the personal factors, the SRL behavior, and the environment (Bandura, 1986, 2002), is useful to examine the use of SRL strategies, the influential factors and effects when students voluntarily use social media for formal learning.

2.4 Social Cognitive Theory

This section first introduces the social cognitive theory. Next, the use of SRL from the social cognitive model is discussed. Finally, the three elements of social cognitive theory (behavior, learner, and environment) are further explained. In particular, the behavior of interest in this study is using SRL strategies. Regarding this, past online learning research that discussed the SRL strategies

are reviewed. In addition, existing work that has examined the influence of personal factors on the use of SRL strategies in the online context are reviewed. Since the influence of personal factors related to technology use has also been highlighted in past research that drew on social cognitive theory, a review of these studies is also presented.

2.4.1 Studies Related to the Social Cognitive Theory

Social cognitive theory is a psychological model to explain human behavior (Bandura, 1986), which was initially developed to explain the acquisition of social behaviors. Social cognitive theory is also applied to the learning context and posits that much of what is learned is gained through observation of the social context. That is, a person's ongoing functioning is a product of a continuous interaction between personal, behavioral, and environmental factors. Social cognitive theory has been applied by prior research to explain human behavior in areas such as technology use, organizational behavior, and mental and physical health (Shapiro & Schwartz, 2012).

In the technological context, past studies have adopted social cognitive theory to explain technology usage and online behavior. For example, Compeau, Higgins, & Huff (1999) drew from SCT and revealed that computer self-efficacy, outcome expectations, affect, and anxiety could exert influence on people's computer usage behaviors. Similar social cognitive factors are also found to be significant predictors of Internet usage LaRose & Eastin (2004), social media usage (Khang et al., 2014), knowledge management usage (Lin & Huang, 2008), and the acceptance of e-learning technologies (Mohammadi, 2015; Šumak et al., 2011). With regard to online behavior in social media, SCT has been employed to understand factors that influence knowledge sharing in virtual communities (Hsu et al., 2007), news sharing in social media (Lee & Ma, 2012; Ma, Lee, & Goh, 2014), online game cheating behavior (Wu & Chen, 2013), as well as cognitive activities such as evaluating information in social media (Hocevar et al., 2014). With regard to online learning, researchers have drawn on SCT to explain the academic achievements in online course learning (Tsai, Chuang, Liang, & Tsai, 2011), as well as online behavior such as information searching strategies (Tsai & Tsai, 2003) and collaborative learning (Wang & Wu, 2008).

Hence, it seems that social cognitive theory can be a useful framework for thinking about how people's learning behavior when using social media.

In terms of self-regulated learning, the social cognitive perspective explains the process of self-regulated learning as an interaction of the behavior of using SRL strategies, personal factors, and the learning environment (Zimmerman, 1989, 2008, 2000), as discussed earlier in section 2.3.1. Specifically, it involves not only behavioral actions in reacting to the environment, but also the self-beliefs that enact the behavioral skills in certain contexts. Correspondingly, related to this study, a social cognitive perspective of SRL in social media entails the use of SRL strategies when people voluntarily use social media for formal learning, as well as the personal factors that influence the use of these strategies. Taken together, SCT provides an appropriate framework to examine the relationships between using SRL strategies and influential factors in the learning context of social media.

2.4.2 *Using SRL Strategies*

In the social cognitive model of SRL, the behavior is the use of SRL strategies. SRL strategies are the deliberate actions that learners take in the learning process to regulate their learning and achieve learning goals (Zimmerman & Pons, 1986; Zimmerman, 2008). As discussed earlier, one assumption of self-regulated learning is that every person attempts to self-regulate learning to some extent to gain the learning goal (Pintrich, 2000). In particular, Zimmerman (1990) suggests that the differences between effective and ineffective forms of self-regulated learning are the quality and quantity of learning strategies used. That is, highly self-regulated learners effectively utilize effective strategies to regulate their learning (Pintrich, 2000; Schunk & Ertmer, 1999; Zimmerman, 2000). Here, it should be noted that self-regulated learning is distinguished from SRL strategies in that the former is a process while the latter is the behavior of optimizing that process (Zimmerman, 1990).

In the online context, past research into self-regulated learning has examined SRL strategies from multiple perspectives. First, some prior research compared SRL strategies use in online and print learning contexts. For example, Farajollahi & Moenikia (2011) compared the use of SRL strategies in the

computer-based and print-based distance learning. They found that the rate of the use of SRL strategies within the computer-based group was higher than the print-based group, who are taught via printed materials in distance learning. The strategies examined in this study were adapted from strategies identified in traditional classroom learning context (Zimmerman & Pons, 1986), which include goalsetting, environment structuring, monitoring, knowledge rehearsing and memorizing, assistance seeking, and self-evaluating,.

However, some other research suggested that a student's experience of self-regulated learning in online learning could be different from the traditional learning environment (Lee & Tsai, 2011). In this vein, prior research aims to uncover people's use of SRL strategies in learning through interviewing successful online learners. In earlier research that examines SRL in the online context, Whipp and Chirelli (2004) examined what SRL strategies were used by students to cope with learning challenges in an online course. It was found that students used strategies such as goal setting and planning, environment structuring, information organization, help seeking, monitoring, record keeping, and self-reflection.

Similarly, in the context of web-based course learning of medical students, Song, Kalet, & Plass (2015) examined four common learning contexts that were related to technology use in health science, including online lecture, independent learning, test preparation, and distraction management. There were ten categories of SRL strategies used in the four learning contexts, including goal setting and planning, seeking information, organizing and transforming, keeping records and monitoring, environment structuring, rehearsing and memorizing, self-consequences, seeking social assistance, reviewing records, and self-evaluation.

In addition, to examine the relationship between online SRL strategies and academic success, Broadbent & Poon (2015) reviewed 10 years of research and nine SRL strategies was identified to be related to online academic achievement in the literature review, including time management, metacognition, peer learning, effort regulation, elaboration, rehearsal, critical thinking, organization, and help seeking. In the meta-analysis, only four learning strategies were found to influence academic achievement, i.e., metacognitive regulation, effort regulation,

time management, and critical thinking. It suggests that students, who are with more awareness of their learning behavior, more perseverance, and better time management, are more likely to get better academic achievements in online learning contexts. However, it should be noted that peer learning was not found to be a significant predictor of online learning performance. Puzziferro (2008) argued that some research might not be representative as it used measures for the traditional classroom to measure online self-regulated learning behavior.

Further, a handful of research examined the self-regulated learning profiles to identify the individual difference in self-regulation. For example, Abar and Loken (2010) identified three distinct groups of students, with different levels of self-regulation in learning. In particular, Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al. 1993) were used to evaluate the SRL strategies used: metacognition, effort management, time and study environment, test anxiety, academic efficacy, academic self-handicapping strategies, and academic skepticism. In terms of online course learning, Barnard et al. (2010) examined two samples of students taking online courses to explore whether profiles for self-regulated learning existed. Based on the measures of six strategies (i.e., environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation) in the Online Self-regulated Learning Questionnaire (OSLQ), it was found that individuals had different academic achievements, depending on their use of the self-regulated learning strategies. Based on the extent to which they use SRL strategies, five distinct groups of self-regulated learners were identified: super self-regulators, competent self-regulators, forethought-endorsing self-regulators, performance/reflection self-regulators, and non-or-minimal self-regulators. Students who are classified as the super and competent self-regulators also revealed a significantly higher level of the highest academic achievement (e.g., GPA) than those who endorse less extent of the use of SRL strategies in their learning.

As the previous literature has shown, SRL strategies cover a range of activities and has been measured by researchers in a number of different ways. A current survey instrument is the OLSQ (Barnard et al., 2009). This instrument consists of 24 Likert items by which students self-report their use of self-

regulating strategies when taking an online course. The OSLQ contains six SRL strategies: environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. Using these SRL strategies has been addressed in a number of studies and has been demonstrated as important strategies that predict high academic achievement in the online learning context (e.g., Roth, Ogrin, & Schmitz, 2016; Tabuenca, Kalz, Drachsler, & Specht, 2015). These SRL strategies have also been observed in the context of online course learning (e.g., Song et al., 2011), web-based job training (e.g., Wan et al., 2012) and are also likely to be adopted when people voluntarily use social media for formal learning as well (Dabbagh & Kitsantas, 2012). This study thus explores whether the six SRL strategies are also employed when people voluntarily use social media for formal learning.

2.4.3 Personal Factors

The social cognitive perspective of self-regulated learning stresses the importance of personal factors in all phases of the SRL process (Zimmerman, 2002). Personal factors in the social cognitive theory refer to the motivational beliefs of a person, such as self-efficacy, intrinsic goal orientation, and task value (Wolters et al., 1996). SRL research has addressed the influence of personal factors related to learning on people's use of SRL strategies (Pintrich, 2000; Zimmerman, 2000). In the technology-mediated learning context, the motivational beliefs are not only about what they need to learn, but also about their use of technologies that support the learning. Research has suggested that only evaluating the personal factors related to learning may not be enough to capture the possible personal influence that can influence learning behavior in a technology-mediated learning context (Bandura, 2002; Zimmerman, 2008). Thus, these two categories of personal factors in online learning settings will be reviewed in the following sections.

2.4.3.1 Personal factors related to learning

Drawing on the social cognitive theory, Zimmerman (2000) highlighted the role of self-efficacy in influencing on all aspects of academic self-regulation. On the other hand, Pintrich (2000) proposed that various personal factors, such as self-efficacy, goal orientation, and value, could affect the use of SRL strategies.

In the context of traditional classroom learning, Pintrich & de Groot (1990) found that higher levels of task value and self-efficacy were related to students' use of effective learning strategies. Task value refers to a student's judgment of how interesting, useful, and important a task is (Cho & Heron, 2015; Pintrich et al., 1991); and self-efficacy refers to a student's confidence in his or her ability to complete a specific task (Bandura, 1997). In the review on research about self-regulated learning and online education from 1995 through 2006, Artino (2007) found that task value and self-efficacy for learning were significant predictors of the use of SRL strategies. Task value, self-efficacy, prior experience with online learning, outcome expectations, online technology self-efficacy were found to influence academic performance (Wang & Newlin, 2002). Moreover, task value, self-efficacy for learning, technology self-efficacy, mastery goal orientation were also positively associated with students' satisfaction of online learning (Artino, 2007). Finally, task value, self-efficacy for learning, computer self-efficacy could influence intentions to enroll in future online courses (Artino, 2007; Lim, 2001). Lawanto, Santoso, & Goodridge (2014) examined the influences of students' perception of course material and self-regulated learning skills on their course performance. Their findings show that task value is positively related to performance. Among the SRL strategies they use, goal setting is the significant predictor of performance, which task value is associated with self-regulated learning behaviors such as goal setting, task strategies, help seeking, and self-evaluation.

While most research treats online learning as an interaction between the learner and the content, a stream of research investigated the social aspect of online learning and highlighted the interaction among online learners. It is proposed that in an online learning environment, interaction with others is also a separate and important aspect of learning (Cho & Summers, 2012). In particular, self-regulated online learners tend to have higher self-efficacy for interacting with peers and instructors. In the subsequent research, Cho and Kim (2013) found that students' self-regulation for interaction with other users (i.e., peers and instructors) could be influenced by students' mastery goal orientation, their perceived importance of interacting with peers, and their perceptions of instructor scaffolding for interaction. In other research, Cho & Heron (2015) found that

self-efficacy for learning was the most significant factor influencing online course achievement. Motivation and emotion are related with the pass of exam and satisfaction. While the SRL strategies are not related to any of the learning outcomes, it is suggested that this may be because the online learning process in this study is predetermined and learners do not need too much self-regulation.

In an online collaborative environment, Wilson and Narayan (2014) found that task self-efficacy was related to task performance. High performance was also associated with high task self-efficacy when participants engaged in subsequent tasks. It is noted that the use of SRL strategies in this study is measured by content analysis of the system records, which reveals the learning strategies students used. It is possible that the system data can only depict the overt learning behavior such as evaluation and seeking social assistance, but individuals with high self-efficacy use more covert learning strategies such as cognitive regulation or motivation regulation.

Similarly, when working collaborative learning tasks, Sins, van Joolingen, Savelsbergh, and van Hout-Wolters (2008) proposed a model to find out how deep or surface cognitive processing may mediate the relationship between students' motivational beliefs (i.e., mastery-approach goal orientation and self-efficacy for the task) and achievement. Their results indicate that mastery-approach goal orientation and self-efficacy for learning were significantly related to achievement. In the context of online workplace training, Wan et al. (2012) found that the extent to which employees use SRL strategies could influence personal factors such as virtual self-efficacy and goal orientation. Intrinsic goal orientation is more related to personal SRL strategies, while performance goal orientation is more related to social SRL strategies.

In summary, prior studies have adopted the social cognitive perspective to examine SRL in the online context and suggested several prominent personal factors related to learning that are associated with the use of SRL strategies. First, self-efficacy for learning, which refers to an individual belief of his or her capability to complete specific learning tasks (Zimmerman, 1989), can influence people's use of SRL strategies. Next, intrinsic goal orientation may also affect how people use strategies to regulate their learning (Pintrich, 2000). Last, task value, which describes the extent to which an individual finds a task important,

useful, and/or interesting (Artino, 2007), can influence one's use of SRL strategies. Hence, the present study employs a parsimonious yet important set of personal factors that have been examined in SRL research in online course learning context and investigates whether they can predict the use of SRL strategies in the learning context of social media.

Here, it is necessary to point out that in the online course learning context, the original self-regulated learning theories only highlight personal factors related to the course or task. That is, people's belief in their ability to master a course, their goal orientation of taking the course, and their evaluation of the value of the course can influence their learning behavior and performance when taking the course online or offline. However, numerous studies in online learning have also suggested that personal factors related to technology use (e.g., computer self-efficacy, Internet self-efficacy) also plays a vital role in people's online learning behavior and performance (Tsai, Chuang, Liang, & Tsai, 2011; Whipp & Chiarelli, 2004). For example, in Wang, Wang, and Shi's (2013) research into online course learning, while the students' self-efficacy for course learning and task value explained 69% of variances of final grade, technology self-efficacy, in terms of general web technology and online learning platforms, also accounted for 21% of variance. The technology self-efficacy was also found to be the mediator between learning motivation and achievement (i.e., the final grade). Hence, this study contends that only evaluating the personal factors of the learning task may not capture all the possible personal influences that might be important for self-regulated learning in social media. Given this, this research extends the social cognitive perspective of SRL by contending that personal factors related to technology usage may also exert influence on people's use of SRL strategies when using social media for learning. The potential personal factors related to technology use will be reviewed in the next section.

2.4.3.2 Personal factors related to technology use

The personal factors examined in the above studies are mainly related to the learning of a subject. However, the existing literature into the online learning context also suggests that personal factors related to technology use may also explain online learning behavior (e.g., Joo, Lim, & Kim, 2011), academic

achievement (e.g., Barnard et al., 2010; Puzziferro, 2008), learning satisfaction (e.g., Artino, 2007). Bandura (2002) also argued that information technologies enabled human to be the agents of learning and the complexities in technologies demand higher-order types of competences. However, the influence of personal factors related to technology use has not been widely explored in self-regulated learning.

Instead, studies into technology use have drawn on social cognitive theory to examine the influence of personal factors related to technology use on various technology usage behaviors. For example, in their longitude study to determine the factors that influence people's computer usage, Compeau et al. (1999) determined that computer self-efficacy, performance outcome expectations, and affective factors (i.e., affect and anxiety) were predictors of computer usage. Lin and Huang (2008) found that knowledge management system self-efficacy and personal outcomes expectations were significant influential factors of knowledge management system usage. In organizational learning, Chatzoglou, Sarigiannidis, Vraimaki, and Diamantidis (2009) found that personal factors in terms of intrinsic goal orientation, enjoyment and self-efficacy of using web-based training were influential factors of employees' intention to use web-based training. Moreover, in a recent study that investigated learning in YouTube found that learning outcome expectations of using YouTube and attitude towards learning in YouTube were found to be the strongest predictors of YouTube usage for learning (Zhou, Lee, & Sin, 2016).

In sum, drawing on literature on technology use, prior studies have affirmed the role of personal factors related to technology use (i.e., technology self-efficacy, outcome expectations, attitude) in predicting people's technology usage behavior. However, these factors have not been assessed as one aspect of the personal factors that influence SRL behavior in the social cognitive theoretical framework. In the context of this study, since social media technologies afford new opportunities for learning, it is possible that personal factor related to social media use may also affect how people self-regulate their learning when using social media. Examining the influences of personal factors related to social media use, in terms of social media self-efficacy, learning outcome expectations, attitude, which have been recognized as important personal factors in past

research, may contribute to more understanding of the personal influences on the use of SRL strategies. In particular, social media self-efficacy refers to people's confidence in their ability to use social media technologies for general learning (Tsai et al., 2011). Outcome expectations of using technology for learning reflect individuals' beliefs about the possible consequences of using the technology for learning (Compeau et al., 1999). Attitude towards technology usage for learning refers to an individual's evaluation of the use of certain technology for learning as either positive or negative (Yang & Chang, 2012). Taken together, when examining the influential factors of SRL in social media, the personal dimension of the social cognitive model of self-regulated learning needs to be extended by taking the personal factors related to technology use into account.

According to the social cognitive model of SRL, in addition to personal factors, environmental factors are also determinants of individuals' behaviors, which could positively or negatively influence people's engagement in SRL strategies (Bandura, 1986; Zimmerman, 1989). In the social cognitive view of SRL, it is posited that people's SRL behavior can be influenced by the presence of a model, verbal persuasion, social support from others or symbolic information (Zimmerman, 1989). In terms of a learning environment mediated by information technologies, Piccoli, Ahmad, and Ives (2001) defined virtual learning environments as open information systems that allow users to interact and communicate synchronously or asynchronously. However, studies on online learning assumed that social learning could be challenging to achieve in the online environment, where communication is solely mediated by technology (Cho, Demei, & Laffey, 2010). In particular, past research has shown that lack of social presence, social interactivity, and social support from peer students and/or instructors could lead to feelings of isolation, which can exert negative impact on engagement, persistence, and academic achievements (Gunawardena & Zittle, 1997; Ke, 2010; Rourke, Anderson, Garrison, & Archer, 2001). This finding highlights potential problems in the social media learning environment. In particular, these studies showed that resources afforded by social media might not be adequate to support the social aspect of learning. Indeed, it is suggested that the features that a technology possess to support learning also play important

roles in how people achieve learning success in a technology-mediated environment review of these studies will be elaborated as follows.

In the discussion about the social cognitive theory and media technologies, Bandura (2002) argued that research on social cognitive theory should consider the influence that technologies have brought to communication. In the literature of technology use, past research has emphasized the role of technology as an environmental factor in explaining how and why individuals use new information technologies for learning (Šumak et al., 2011). In particular, technological factors of an e-learning system, in terms of quality, reliability, usefulness and ease of use, are important determinants of learners' intention to use e-learning technology (e.g., Sumak et al., 2011), persistence in online learning (e.g., Joo et al., 2011), affective reaction to the online learning experience (e.g., Paechter, Maier, & Macher, 2010), and learning achievement (Cho & Heron, 2015).

In online learning research, the affordance approach has been applied to understand the relationships between technology properties and the learning activities that were enabled to occur by these properties (Kirschner, 2002). Some researchers have highlighted the importance of using the affordance approach to understand how teaching and learning can be supported by online technologies (Conole & Dyke, 2004). Indeed, scholars who study the use of technology have found great utility in the concept of the affordance, which is of great utility to understand the various ways users adopt, appropriate, and reinvent the material features of technologies to accomplish tasks (Rice et al., 2017).

2.5 The Affordances Approach

The term “affordances” was defined by Gibson (1986) in the field of ecological psychology. In the animal-environment relationship, affordances refer to the action possibilities of the properties of a given environment that animals perceive. With regard to the affordances of social media, it reflects the possible actions that users perceive they could apply social media relative to their needs or purposes (Lai, 2017; Rice et al., 2017; Treem & Leonardi, 2012). In the area of organizational knowledge sharing, four social media affordances, i.e., metavoicing, triggered attending, network-informed associating, and generative

role-taking, were suggested by Majchrzak et al. (2013) to represent different ways that social media were used by employees to share knowledge in the workplace. In the domain of customer engagement, Cabiddu et al. (2014) revealed that social media affordances, including persistent engagement, customized engagement, and triggered engagement, could enhance customer engagement in a tourism domain. boyd (2010) described a set of affordances to examine the role of social media affordances in shaping networked publics and people's participation, including persistence, replicability, scalability, and searchability. In the context of social media use in organizations, Treem and Leonardi, (2012) explored the affordances of visibility, editability, persistence, and association, which could influence the communication process such as knowledge sharing and relationship formation.

In educational literature, affordances of social media have mainly been examined in the mandatory context. For example, Wang, Woo, Quek, Yang, and Liu (2012) examined the use of Facebook group in course design. It was found that Facebook could afford sharing learning resources, organizing learning activities, and communicating and interacting with other students by using certain Facebook features. While Wang et al. (2012) only focused on the use of Facebook group, Väljataga, Pata, and Tammets (2011) examined college students' perceptions of the affordances of four social media tools (i.e., blog, wiki, aggregator, and social bookmarks) in an educational technology course. According to their similarity and semantics, affordances of these social media were categorized into nine types (e.g., self-tutoring, collaborative creative assignments, individual creative assignments, etc.). Dabbagh and Kitsantas (2012) developed a pedagogical framework of social media affordances that can scaffold students' self-regulated learning. It is argued that social media can not only be the vehicle of learning, but also be effective pedagogical tools that guide students to engage in cognitive process. For example, blogs and wikis can afford personal information management by enabling self-generating content. This personal information management afforded by social media can facilitate a student's use of SRL strategies such as goal setting. In addition, social interaction and collaboration afforded by social media can foster students' engagement in SRL strategies such as help seeking. Lastly, social media can afford information

aggregation and management. This affordance of social media can influence students' engagement in self-evaluating their overall learning performance and experience.

However, it should be noted that these studies discussed social media affordances from an instructor's perspective and had focused on the pedagogical use of social media in the mandatory-use context. In the voluntary context, social media use for formal learning is driven by students. In this vein, students have control of what to learn and which social media to employ (Greenhow & Lewin, 2016). This means they may have different perceptions of the affordances of social media for their learning in the voluntary-use context, thus warranting research in the present study.

2.6 Learning Satisfaction

Evaluating the learning outcome is important in formal education because it indicates the effectiveness of the learning process of a course (Kuo et al., 2013). In particular, most studies have measured a student's learning outcome, on the basis of measures such as academic performances, which are generally expressed in terms of particular grades of learning tasks, assignments, or exams (e.g., Broadbent & Poon, 2015; Wei, Peng, & Chou, 2015). Academic performances are considered as important cognitive learning outcome variables with the merits of objectively evaluating a student's acquisition of knowledge and skills for problem solving, as well as providing accurate records about a student's learning progress (Chang et al., 2015; Paechter et al., 2010).

However, in the context of voluntary use of social media for formal learning, there are some limitations of measuring a student's learning outcome with his or her academic performance. First, many courses use non-standardized tests, which have lower reliability and validity (Thorndike, 2005). This can provide little generalizable information for researchers to examine the significant relationships between independent variables and the learning outcome. Second, when social media use is not a compulsory part of formal learning, such as the voluntary context explored in this study, the direct learning outcome of using social media for learning is normally not assessed in the form of a formal test,

but evaluated subjectively by the students themselves (Greenhow & Lewin, 2016; Hong et al., 2016). Finally, the objective course grades reveal more about the knowledge a student gain from a course, but less about students' actual learning experience, thus not suggesting to what extent students are motivated to continue learning voluntarily (Liaw, 2008). Meanwhile, research has suggested that lifelong learning is mainly driven by a student's learning satisfaction and interest (Paechter et al., 2010). In this light, learning satisfaction, which is an affective learning outcome, has been used by prior research to evaluate a student's learning experience in the voluntary context (e.g., Hong et al., 2016).

In particular, learning satisfaction has been found to be related to several learning outcome variables such as perceived course quality (Lee & Lee, 2008), knowledge retention (Kuo et al., 2013), and academic performances (Cho & Heron, 2015). Online learners' satisfaction has also been used as valuable information for educational institutions to evaluate online course programs (Din, Haron, Ahmad, & Rashid, 2015). To summarize, a student's satisfaction is suggested as a critical indicator of successful use of a learning system (Kuo et al., 2013; Puzziferro, 2008). It is thus worthwhile to evaluate the effectiveness of using social media voluntarily for formal learning by the measure of students' learning satisfaction.

In addition, due to the reciprocal interaction posited in the social cognitive theory, people's perceptions, such as learning satisfaction, can also be affected by the behavioral performance (Bandura, 1986; Zimmerman, 1989). Moreover, prior studies also indicated that online learners who are less self-regulated could be less likely to gain learning satisfaction with online courses (Artino, 2007; Puzziferro, 2008). Therefore, it can be contended that the greater extent of using SRL strategies can predict a higher level of learning satisfaction with social media.

CHAPTER THREE STUDY 1

This chapter presents the conceptual model for Study 1, which aims to investigate the influences of personal factors on the extent to which students use SRL strategies, as well as the effects of using SRL strategies on students' learning satisfaction in social media when they voluntarily use social media for formal learning in school. In detail, drawing on the social cognitive theory (Zimmerman, 1989, 1990) and prior research, Study 1 proposes that two categories of personal factors may influence the extent to which students employ SRL strategies. Personal factors in the first category are related to learning, and they are self-efficacy for learning, intrinsic goal orientation, and task value. Personal factors in the second category are related to social media use, and they are social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning. This study further proposes that the extent of using these SRL strategies will in turn be associated with students' learning satisfaction with social media. These constructs and their relationships will be elaborated in the following sections.

3.1 Using SRL Strategies

SRL strategies refer to the deliberate actions that a learner employs to direct, monitor, and regulate learning to achieve their goals (Zimmerman & Pons, 1986; Zimmerman, 2008). A series of earlier studies in the traditional academic context conducted by Zimmerman and his colleagues have revealed consistent positive relationships between using SRL strategies and academic achievements (e.g., Zimmerman & Pons, 1986; Zimmerman & Martinez-Pons, 1988; Zimmerman, 1990). In the online course learning context, prior research also revealed that students' use of SRL strategies could not only influence their academic achievement in an online course (Broadbent & Poon, 2015), but also predict their satisfactory learning experience (Artino, 2007). In this light, the degree to which students use SRL strategies can be considered as an important indicator of effective learning both offline and online (Willoughby, Anderson, Wood, Mueller, & Ross, 2009; Zimmerman & Martinez-Pons, 1988).

In the learning context that students voluntarily use social media for formal learning, the students are responsible for initiating and regulating their learning process. Compared to the mandatory use of learning technologies, voluntary use of social media empowers students with more autonomy and control over their technology usage and learning process (Robertson, 2011). In a learning context with high autonomy, educational scholars (e.g., Dabbagh & Kitsantas, 2004; Schunk & Zimmerman, 1997) have suggested that learners must be capable of using self-regulated learning strategies to manage their learning. Recent research on online learning has suggested that SRL strategies, in terms of goal setting, environment structuring, time management, help seeking, task strategies, and self-evaluation, are important strategies that students should adopt to achieve online learning success (Barnard et al., 2010; Barnard, Lan, To, Paton, & Lai, 2009). These SRL strategies have also been observed in the context of online course learning in school (e.g., Song et al., 2011) and web-based job training (e.g., Wan et al., 2012). They are likely to occur when students voluntarily use social media for academic learning as well (Dabbagh & Kitsantas, 2012). This study thus contends that using SRL strategies, in terms of goal setting, environment structuring, time management, help seeking, task strategies, and self-evaluation, can be an effective learning behavior that students enact to some extent to accomplish learning goals in the context of voluntary use of social media for formal learning.

Goal setting refers to making decisions on the specific objective of learning or performance (Pintrich, 2000). In the contexts of traditional classroom learning, the goals of learning can be achieving a good grade or gaining a better understanding of a topic (Schunk, 2005). When voluntarily using social media for a course learning in school, students have more autonomy and control of their learning. A student's learning goal in social media should align with the learning objectives of a course so that effective learning in social media can be achieved (Zimmerman, 1990). Through setting a goal for learning in social media, students can gauge the amount of effort and time required for attaining the goal. In addition, with various social media available and voluntary options, the learning goal will also serve as a guidance regarding what resources and social media platforms to harness. For instance, medical students with a learning goal of

acquiring psychomotor skills used YouTube to learn about “how-to-do something” step by step (Lee & Lehto, 2013). Students may also set a goal of understanding a concept in a course by engaging in an issue-oriented debate on Facebook (Greenhow & Lewin, 2016). Therefore, goal setting can be an important strategy for learners to enact to guide their learning process when voluntarily using social media for formal learning in school.

Environment structuring describes students’ efforts to seek suitable environments that are conducive to learning. Wu (2015) suggested that environment structuring is a strategy that students use to take control of attractions and distractors from the environment. Different from traditional face-to-face classroom learning, students who voluntarily use social media for formal learning have the freedom to choose the environment with fewer distractions beyond the classroom. As distractions in a learning environment can challenge students’ control of their attention and learning behavior, students’ engagement in environment structuring can help them concentrate on their learning with social media.

Task strategies are purposive actions directed at acquiring knowledge (Zimmerman, 1989). These strategies can be strategies that facilitate information processing, such as notes taking and outlining. There are also rehearsal strategies to help remember important content, such as using some mnemonics to facilitate memorizing. Recent research on social media use for learning suggests that social media possess features that users can use to facilitate their acquisition of knowledge (Cho & Cho, 2013). For example, students could set up a personal library to save course-related content in Flickr and YouTube, which would be used for reviewing and self-reflection (Dabbagh & Kitsantas, 2012). Students can also use a social bookmarking tool to manage and organize online information that is related to course learning (McCloughlin & Lee, 2007). Enacting the task strategies in social media can lead students to deep learning and more effective knowledge acquisition (Kind & Evans, 2015).

Help seeking is a behavior that the learner employs resources to assist the accomplishment of learning tasks (Zimmerman, 2008). Research has suggested self-regulated learners would be more likely to engage in help seeking when they

come across learning problems, instead of just accomplishing every task on their own (Cheng et al., 2013). Researchers have suggested that the help seeking behaviors can be facilitated in social media. For example, Greenhow & Lewin (2016) found that learner's help seeking processes were facilitated when engaging in collaborative learning through a Facebook group. Puustinen et al. (2011) analyzed help seeking messages related to homework in an online discussion forum, and also found that students were more active in asynchronous online help seeking than the oral and face-to-face request. In other words, social media provide new possibilities to facilitate academic help seeking. Hence, help seeking enable students to solve a problem through collaborative learning, which is likely to improve knowledge retention.

Time management refers to strategies that assist learners in managing their time effectively (Dabbagh & Kitsantas, 2005). In traditional education, time management was found to be strongly associated with university students' grades (Wolters et al., 2005). When voluntarily using social media for formal learning in school, time management skills are vital as self-discipline is required in order to align with the schedule of a course. In this vein, to achieve effective learning in social media, it seems necessary for students to have good time-management skills.

Self-evaluation refers to assessing the learning outcome by comparing it with the learning goal or an assessment standard (Zimmerman, 2000). In the learning process, learners evaluate and judge their performance towards their learning goals (Zimmerman & Pons, 1989). Social media also seem to encourage some unique self-evaluation strategies. For example, Robertson (2011) investigated blogging and suggested that blogging could be a medium for reflective journal writing which in turn would promote learning. The social interactivity afforded by social media can also help learners use peer feedback to assess their learning performance (Dabbagh & Kitsantas, 2012). This self-evaluation strategy helps learners review the knowledge they have acquired and monitor their learning progress. When learners realize that they achieved acceptable and satisfactory progress, their self-efficacy and learning motivation can be further enhanced (Schunk, 2005).

Taken together, SRL strategies, in terms of goal setting, environment structuring, task strategies, time management, help seeking, and self-evaluation, can be important actions that are adopted by self-regulated learners to optimize their learning. An assumption underlying the social cognitive views of SRL is that SRL strategies were used by every learner in the process of knowledge acquisition; however, effective self-regulated learners are distinguished by the extent to which they use these strategies to accomplish their learning goals (Zimmerman, 1990). This study contends that it is possible SRL strategies uncovered in prior research, such as goal setting, environment structuring, time management, help seeking, task strategies, and self-evaluation, are also used by students when learning with social media in the voluntary context.

As reviewed in Chapter 2, existing SRL research (e.g., Artino, 2007; Azevedo et al., 2008; Lawanto, Santoso, & Goodridge, 2014) found that when students take a course or undertake course-related activities on an online learning system, both personal factors related to learning (e.g., self-efficacy for learning) and personal factors related to technology use (e.g., online technology self-efficacy) can exert influence on students' use of SRL strategies. In addition, the extent to which students use SRL strategies was also found to influence their satisfaction with using a learning system (Artino, 2007; Kuo et al., 2014). Given that learning in social media is also a form of the technology-mediated learning environment, it is possible that when students voluntarily use social media to support their formal learning in school, these personal factors can also exert influence on their use of SRL strategies, which in turn affect their learning satisfaction with social media. Accordingly, drawing from past research, Study 1 proposes to investigate two categories of personal factors as influential factors of SRL strategies use: personal factors related to learning and personal factors related to social media use. In particular, the personal factors related to learning include self-efficacy for learning, intrinsic goal orientation, and task value; the personal factors related to social media use consist of social media self-efficacy, learning outcome expectations for social media, and attitude. In addition, Study 1 also proposes that the extent of using SRL strategies can exert influence on students' learning satisfaction with social media. These relationships among the

personal factors, SRL strategies use, and learning satisfaction will be explained in detail in the following sections.

3.2 The Influences of Personal Factors Related to Learning

Personal factors in the social cognitive model of SRL refer to the motivational beliefs of a learner (Wolters et al., 1996). Prior empirical research revealed that learners who engaged more in SRL strategies have higher self-efficacy for learning (Wang & Wu, 2008), are intrinsically goal-oriented (Chatzoglo et al., 2009), and put a higher value on the learning task (Lawanto et al., 2014). Hence, the present study investigates how personal factors related to learning, in terms of self-efficacy for learning, intrinsic goal orientations, and task value, can be associated with the extent to which students use SRL strategies when voluntarily use social media to support formal learning.

3.2.1 *Self-Efficacy for Learning*

Self-efficacy refers to a student's belief about his or her capabilities to engage in actions required to accomplish tasks (Bandura, 1997; Zimmerman, 2000). Research has found that higher self-efficacy beliefs can lead to higher engagement in self-regulation strategies (Pintrich & de Groot, 1990). The use of self-regulation strategies can in turn improve academic achievement and also increase self-efficacy beliefs of accomplishing tasks (Bouffard-Bouchard, Parent, & Larivee, 1991). In terms of a particular learning task, self-efficacy for learning refers to an individual's belief about having the capability to accomplish the learning task effectively (Kim, Wang, Ahn, & Bong, 2015). Social cognitive theorists assume that the self-belief of personal efficacy is the foundation of human agency which can influence the effort that people decide to invest in action and their perseverance when encountering challenges and obstacles (Bandura, 1986; Zimmerman, 1989). Hence, students with higher self-efficacy are more persistent when encountering challenges or problems in the process of learning (Bandura, 1986).

Prior research on online course learning noted that self-efficacy for learning is positively related to a student's online learning behavior and performance. For instance, Chang (2005) found that the application of SRL strategies was associated with students' self-efficacy in completing a technology-mediated

learning task. This was supported by Sins and van Joolingen (2008) who found that self-efficacy for learning had a significant positive effect on knowledge acquisition in an online collaborative learning environment. Moreover, Littlejohn and Milligan (2015) found that those with higher self-efficacy of accomplishing the course were more likely to employ SRL strategies, such as goal setting, task strategies, and help seeking strategies. On the basis of the findings in previous empirical research, this study hypothesizes that when students voluntarily use social media to support formal learning in school, self-efficacy for learning will be positively related to the extent of using SRL strategies. Hence, the following hypothesis is proposed:

Hypothesis 1: A student with higher self-efficacy for learning is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.2.2 *Intrinsic Goal Orientation*

Goal orientation refers to the motivational beliefs of why a student participates in learning (Pintrich et al., 1991; Schunk & Zimmerman, 2012). People with intrinsic goal orientation engage in learning for reasons such as improving understanding and mastery of the learning task or taking on challenges in the process of learning. According to goal orientation theories (Pintrich, 2000), students with a higher degree of intrinsic goal orientation are more willing to learn new skills to gain competency and engage in effective strategies to deal with challenges.

When students voluntarily use social media to support formal learning in school, their intrinsic goal orientation of learning a course may influence their learning behavior in terms of using SRL strategies when using social media for the course. In particular, students with intrinsic goal orientation care more about the process of learning and believe that their skills and intelligence can be developed (Pintrich, 2000). In this vein, it is possible that they may be more likely to invoke the strategy of goal setting so that their learning in social media is

guided by the goal that aligns with the course requirement, to manage their time of learning in social media, as well as to self-evaluate their learning progress to make sure that they have mastered the content.

Hypothesis 2: A student with higher intrinsic goal orientation is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.2.3 *Task Value*

Task value refers to a student's judgment of how interesting, useful, and important a learning task is (Cho & Heron, 2015; Pintrich et al., 1991). The way people value the learning task can influence their learning behavior and academic performance (Lawanto et al., 2014). That is, high task value beliefs motivate students to spare more effort and time on the task, thus engaging in deep cognitive and metacognitive learning process (Pintrich, 2004). If a learning task is valued as less important, useful, or interesting, students may be less likely to spend time and effort to utilize SRL strategies to accomplish those tasks effectively (Zumbrunn, 2011).

Past research has revealed task value as a predictor of online learning behavior, experience, and performance when students conduct online learning. In general, it is found that task value can be positively related to students' overall learning satisfaction (Artino, 2007; Lee, 2002), and continuance intention to learn online (Chiu & Wang, 2008). In an online engineering course, Lawanto, Santoso, & Goodridge (2014) found that task value is associated with the use of SRL strategies in terms of goal setting, task strategies, help seeking, and self-evaluation. Artino (2007) also found task value to be a strong predictor of students' use of task strategies such as critical thinking, elaboration, and metacognitive strategies when taking an online course. Similarly, it is also found that when people engage in a learning task they do not value, they would be less likely to spare effort to self-regulate their learning, and can be easily get distracted in the social media environment (Wu, 2015). Given the discussions

and findings about the influence of task value in previous research, this study contends that an individual students' belief of the value of a course (i.e., the task) can exert influence on their engagement in SRL strategies when voluntarily using social media for their study of that course.

Hypothesis 3: A student with higher task value is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.3 The Influences of Personal Factors Related to Social Media Use

In a learning context mediated by technologies, learning resources distribution and social interactions relied on information technologies to occur. Bandura (2001) posits that with the increasing complexity of technology, technological-competence are required for individuals to be successful in a technology-mediated environment. Such technological competence is shaped by individuals' attitudes, perceptions and experience towards the use of the technology (Lee et al., 2012). In this vein, research in online learning has revealed that personal factors related to technology use (i.e., technology self-efficacy, outcome expectations, and attitudes) can also exert influence on people's online learning behavior and performance (e.g., Artino, 2007; Whipp & Chiarelli, 2005).

3.3.1 *Social Media Self-Efficacy*

Technologies available to learners are effective for learning only if learners possess self-efficacy for using them (Bandura, 2001b). As Eastin and LaRose (2005) posit, "self-efficacy determines what and how often a person engages in a given behavior, the amount of effort and persistence put forth when faced with obstacles, and finally, the mastery of the behavior" (p. 980). In this vein, individuals with high technology self-efficacy are more confident of their skills in using technologies for learning purposes (Wan, Compeau, & Haggerty, 2012). Here, the technology of interest in this study is social media. Social media self-efficacy is thus defined as people's belief about their abilities to use social media technologies to support formal learning in school (Hong et al., 2016).

While research on social media self-efficacy in the learning context is scarce, an analogous construct that has been widely discussed in online learning research is Internet self-efficacy (Joo et al., 2000; Wu, 2015). Past research on online course learning has found that learners with high Internet self-efficacy were more likely to have better online learning performance in terms of academic achievement and satisfaction (Liang & Tsai, 2008; Tsai et al., 2011). This is because they are more likely to harness online technologies to tackle the challenges they encounter and to persist until accomplishing learning goals (Hong et al, 2016). Regarding the voluntary use of social media for learning, students also need to be capable of leveraging various social media technologies to meet their learning needs. In particular, learners with higher social media self-efficacy can be more experienced with how to harness different social media platforms to support different learning goals (Tower, Latimer, & Hewitt, 2014). Therefore, the following hypothesis is posited:

Hypothesis 4: A student with higher social media self-efficacy is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.3.2 Learning Outcome Expectations for Social Media

Outcome expectations are a student's beliefs about the consequences of performance (Bandura, 1997). Social cognitive theory posits that adaptive behavior can lead to material, social, or self-evaluative outcomes (Bandura, 1986, 2001). With expectations of desirable outcomes, behaviors are motivated to be enacted (Bandura, 2002). The expected learning outcomes for social media includes enriching course-related knowledge, practicing technology skills, improving social interaction with peers and instructors, and expanding learning networks (Hamid, Waycott, Kurnia, & Chang, 2015).

Past studies revealed that learning outcome expectations can be salient predictors of people's online learning behaviors. For example, studies in online learning have demonstrated that expectations of learning outcomes for a learning

system can be critical factors that influence people's continuous intention to learn online (Chen, Yeh, Lou, & Lin, 2013). With regard to e-learning platforms, Paechter, Maier, and Macher (2010) also found that students' expectations of learning outcomes, in terms of knowledge acquisition, free choices of learning strategies, acquiring skill using the Internet, and interactions with peer students, are related to their course satisfaction and perceived learning achievements. Likewise, this study contends that when people have a higher expectation that using social media can lead to desirable learning outcomes, they may be more likely to engage in SRL strategies to achieve these learning outcomes. Thus, Study 1 proposes the following hypothesis:

Hypothesis 5: A student with higher learning outcome expectations for social media is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.3.3 Attitude

Attitude towards using social media for learning refers to an individual's evaluation of using social media as learning tools (Lawanhto et al., 2014). People's perceived positive attitude towards a particular behavior can exert a strong influence on their enactment of that behavior (Bandura, 2002; Compeau & Higgins, 1995; Compeau et al., 1999). Prior research on technology use has revealed that positive attitude towards computer, Internet, or social media not only influence people's intention to use these technologies (Compeau et al., 1999; LaRose & Eastin, 2001; Khang, Han & Ki, 2014), but also influence their actual usage behavior (Piccoli, Ahmad, & Ives, 2001). In terms of learning, research found that when students looked forward to learning activities that require the use of learning technologies, they would be more likely to engage in effective learning (Piccoli et al., 2001). You and Kang (2014) also found that students who enjoyed online learning had a higher level of self-regulation. These studies suggested that an individual's attitude towards a technology could be associated with their technology usage behavior.

When voluntarily using social media to support formal learning, learners can interact extensively with different social media technologies and learn from useful resources in text, videos, and/or audios, as well as communicate with other users on these platforms (Lee & Lehto, 2013; Tower et al., 2014). In such a learning context, individuals who have positive attitude towards using social media for learning may have lower anxiety level and more excitement to engage in the learning process, as well as to employ SRL strategies in pursuit of their learning objectives in social media. Hence, this study contends that attitude towards using social media for learning can impact the extent to which people use SRL strategies when learning in social media. Thus, this study proposes the following hypothesis:

Hypothesis 6: A student with more positive attitude towards using social media for learning is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, when voluntarily using social media to support formal learning in school.

3.4 The Effects on Learning Satisfaction

Due to the reciprocal interaction posited in the social cognitive theory, personal perceptions, such as learning satisfaction, can also be affected by the behavioral performance (Bandura, 1986; Zimmerman, 1989). Prior studies have also examined satisfaction as the affective learning outcome, which refers to a positive affective learning outcome that results from an evaluation of a learning experience (Elliott & Healy, 2001). Studies in online course learning have revealed the positive effects of using these SRL strategies on people's learning experience (e.g., Artino, 2007; Kuo et al., 2014).

When students voluntarily use social media for formal learning, it is possible that the extent to which they use SRL strategies may exert influence on their learning satisfaction with social media. For example, when learners set goals for every stage in their learning, the goals convey evidences of progress and are meaningful for learners (Pintrich, 2000). This progressive mastery further provides them with immediate satisfaction in the learning process (Schunk &

Schwartz, 1993; Zimmerman & Kitsantas, 1997). In addition, through structuring a distraction-less learning environment, students can be more focused on learning, thus gaining more enjoyment from the learning process (Wu, 2015). Moreover, when using effective task strategies, such as notes-taking and highlighting, the acquisition of knowledge and skills can be facilitated. This cognitive achievement can also bring satisfaction to the learner (Paechter et al., 2010). Some studies suggested that applying time management skills in the learning process could also help students avoid procrastination and anxiety (Michinov et al., 2011). Further, help seeking through various forms of social interactions, such as learner-learner interactions and learner-instructor interactions, were found to promote student satisfaction with online learning (Kuo et al., 2014). Through help seeking, learners can also gain encouragement from other users on social media to alleviate their anxiety caused by problems (Cheng, Liang, & Tsai, 2013). Last, perceived learning satisfaction with social media can be deemed as a result of self-evaluating the learning experience. Hence, the above discussion leads to the expectation that when students voluntarily use social media for course learning in school, the extent of their use of SRL strategies can be associated with their satisfaction with the learning experience in social media. Thus, the following hypothesis is proposed:

Hypothesis 7: The extent to which people engage in SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) task strategies, (d) time management, (e) help seeking, and (f) self-evaluation, is positively associated with their learning satisfaction with social media when voluntarily using social media to support formal learning in school.

In sum, drawing on social cognitive theory and prior studies on online learning and technology use, the present study proposes a conceptual model for Study 1 to understand how personal factors related to learning (i.e., self-efficacy for learning, intrinsic goal orientation, and task value) and personal factors related to social media use (i.e., social media self-efficacy, learning outcome expectations for social media, and attitude) can influence the extent to which SRL strategies are employed when people voluntarily use social media to support formal learning in school, as well as how using SRL strategies of goal setting,

environment structuring, task strategies, time management, help seeking, and self-evaluation can influence people's learning satisfaction with social media. The conceptual model with all hypotheses is presented in Figure 3.1.

Figure 3.1 Conceptual model for study 1

3.5 Method

Study 1 aims to investigate the influential factors and effects of people's use of SRL strategies when voluntarily using social media for formal learning. In particular, the present study seeks to examine the influential factors and effects of students' use of SRL strategies when voluntarily using social media formal learning in school. To empirically validate the hypotheses in the proposed conceptual model, Study 1 adopted a survey approach. This section presents the research procedures, including the sampling method, research design, data collection procedures, survey instrument, and data analysis are elaborated.

3.5.1 Sampling

This study employed the non-probability convenience sampling, which collects information from participants that are accessible and are willing to participate. Convenience sampling has been commonly used in social science research when the full population is not well-defined (Etikan et al., 2016). In addition, convenience sampling has advantages of being more accessible, less expensive, and more timely, which is important for research on social media. In this vein, it is probably used more often than any other kind of sampling in research (Vogt, 2007). However, the downside of a convenience sample is that it may not well represent the general population. Regarding this, it is suggested that researchers could minimize the bias problem by providing a clear describing of how the sample was obtained and the composition of participants (Gravetter & Forzano, 2012).

In light of this limitation, the potential problems associated with convenience sampling can be minimized by some strategies, such as collecting data from a relatively representative group with less bias (Gravetter & Forzano, 2012). In particular, the aim of Study 1 is to investigate students' use of SRL strategies when voluntarily using social media for formal learning in school. In this vein, participants were recruited from students at Nanyang Technological University (NTU) in Singapore. Prior studies suggested that students from higher education could be an important age demographic of both online learners (Hood et al., 2015) and social media users (Khang et al., 2014).

As suggested by Green (1991), when testing multiple correlations, the sample size should be $N > 50 + 8m$ (m represents the number of IVs). There are six independent variables in the conceptual model of Study 1, so the target sample size in the present study was set to be more than 98. All participants were required to be at least 18 years of age and have the experience of using social media for learning. The sampling was further designed to exclude the part-time students who reported the use of social media was to support their formal learning at work (i.e., job training) rather than a course learning in school. Respondents who reported the use of social media for formal learning in school is compulsory were also excluded.

3.5.2 Research Design

Study 1 employed a cross-sectional survey research design, involving collecting quantifiable data from a population at a particular time (Creswell, 2013). Based on prior research, a survey instrument was developed. It was later administered to participants who have the experience of using social media for learning. In the questionnaire, as attached in Appendix B, participants were asked to recall the most recent course in school or job training in workplace in which you use social media to support your study. Using social media voluntarily for a course was described as a context in which social media use is not compulsory in the course. Next, responses to all questions related to social media use and learning were based on subjects' personal experience of the course they selected. In the following data analysis, responses were removed if the respondents chose a course that was in the context of the workplace and their use of social media for the course was partially or fully compulsory.

This study did not narrow the focus to a single course or subject for the three main reasons. First, findings from earlier research on web-based training (e.g., Wan, Compeau, & Haggerty, 2012) revealed that the course subject did not have effects on people's learning behaviors and performance. Second, drawing from prior research, this study takes into account people's perceptions of a course, in terms of personal factors related to learning (i.e., self-efficacy for learning, intrinsic goal orientation, and task value), and proposes that these are the course-related factors that influence the extent to which they engage in SRL strategies

for that course. Finally, the aim of this study is to investigate the relationships between students' perceptions, learning behaviors and experience when using social media voluntarily for a course. In the voluntary context, different students may vary in the courses that they prefer to engage in voluntary use of social media to support learning. By recalling the learning experience and behaviors in a recent period, participants are more likely to report accurate answers. Fading affect bias could be introduced if participants were asked to recall based on course types (Schwarz & Oyserman, 2001), this study wishes not to limit the focus to a specific course subject.

The following part of the questionnaire included items to measure participants' the personal factors related to learning (i.e., self-efficacy for learning, intrinsic goal orientation, and task value), personal factors related to social media usage (i.e., social media self-efficacy, learning outcome expectations for social media, and attitude), self-regulated learning strategies they might use in their social media learning experience in that course, and learning satisfaction in social media for that course. Finally, questions about participants' demographics and academic backgrounds were also included.

This study focused on a broad range of social media, instead of a specific platform. The social media types were listed in the questionnaire and examples for each type of social media were given as references, including social network sites (e.g., Facebook, LinkedIn, Academia. edu), microblogging (e.g., Twitter, Weibo), multimedia sharing (e.g., YouTube, Instagram, Slideshare), wikis (e.g., Wikipedia), social bookmarking (e.g., Delicious), virtual communities (e.g., Quora, Reddit, Github), video conferencing (e.g., Skype), text Chat (e.g., WhatsApp, LINE, WeChat), and web-based (cloud-computing) office tools (e.g., Google Doc, Calendar sharing). This study did not narrow the focus to a specific learning subject or a specific social media platform for three main reasons. First, findings from earlier research on web-based training (e.g., Wan, Compeau, & Haggerty, 2012) revealed that the course subject was not significantly associated with people's learning behavior and performance. Second, with easy access to various social media, prior research has suggested that students tend to harness different social media to construct a social media learning environment for their formal learning (Dabbagh & Kitsantas, 2012). Finally, as social media provide

voluntary options for students to engage in learning for various domains (Tess, 2013a), this study contends that it is more meaningful to investigate how to effectively use different social media to support formal learning broadly versus narrowly using a single platform for a particular subject. Therefore, the learning subjects and social media platforms were not distinguished in this study; instead, this study focused on students' learning behavior in terms of using SRL strategies when voluntarily using social media for formal learning in school.

To enhance face validity, a pilot study was administered. Five graduate students were invited to validate the scales and clarify question wording. Minor changes were made on a few wording and format issues in the questionnaire. The implementation of Study 1 was approved by the NTU Institutional Review Board (IRB). The IRB approval and questionnaire were attached in the Appendixes A and B, respectively.

3.5.3 Measures

The first part of the questionnaire includes questions about basic demographic information such as gender, age, and educational background. The other part included direct measurement of the variables in the conceptual model proposed in Study 1. To improve content validity, this study measured the constructs with items adapted from existing scales from prior studies (e.g., Barnard et al., 2009; Hong et al., 2016; Wolters, Pintrich, Karabenick, Moore, & Lippman, 2005). In particular, a total of 36 question items were used to assess the personal factors (i.e., self-efficacy for learning, intrinsic goal orientation, task value, social media self-efficacy, learning outcome expectations for social media, and attitude). Additionally, SRL strategies were measured by the 24-item Online Self-regulated Learning Questionnaire (OSLQ; Barnard et al., 2009). Last, a total of 6 question items were used to assess learning satisfaction in social media. Consistent with prior research from where the scales of this study were adapted, all items measuring the constructs were assessed by five-point Likert scales with anchors ranging from 1 (= "strongly disagree") to 5 (= "strongly agree"). In particular, the Likert scale is an ordinal scale from which respondents choose how they agree or disagree with a particular statement, and has been commonly used in social science research as an effective measurement tool to assess

respondents' attitudes, beliefs, and/or behaviors (Carifio & Perla, 2008). However, because the interval distance between responses cannot be measurable in an ordinal scale, the meaning of descriptive statistics (e.g., the mean and the standard deviation) of a single Likert item should be interpreted with caution (Sullivan & Artino, 2013). Nevertheless, when a construct is measured with multiple Likert items, as many research has confirmed, parametric tests (e.g., correlation, factor analysis, and multiple regression) are robust enough to yield unbiased results when analyzing Likert scale responses (Carifio & Perla, 2007; Norman, 2010; Sullivan & Artino, 2013). Thus, it is appropriate to use Likert scales in this study as the constructs in the conceptual model were measured by multiple items with validity and reliability, and their relationships were tested using multiple regression.

Prior to testing the hypotheses, a series of scale refinement processes was conducted to assess the reliability and validity of the measures. To test measurement validity of the six types of SRL strategies, principal component analysis with Promax rotation was conducted. The Promax rotation, which is an oblique rotation, was used because the six types of SRL strategies were correlated conceptually (Zimmerman, 2000). Next, principal component analysis with the Varimax rotation was conducted on all the items of personal factors. A separate principal component analysis with Varimax rotation was also conducted on the measurement items of satisfaction. Varimax rotation was applied to identify distinct, independent factors that were orthogonal to one another (Muijs, 2005). According to Kaiser's criterion, major factors were retained with eigenvalues equal or higher than 1 (Girden, 2001). In terms of items selection, factor loadings of an item on a construct should be greater than 0.50, and discrepancies between cross-loadings should be less than 0.15 (Shen et al., 2013).

Convergent validity was checked to ensure valid items converge on the same construct. In particular, factors' loadings of a valid item on a construct should be more than 0.50 (Bagozzi, 1980). Reliability analysis using Cronbach's alpha was then carried to ensure the reliability of each measure. To achieve good internal consistency, the value should exceed 0.70 (Tabachnick & Fidell, 2007).

Table 3.1 to 3.2 present the items loaded on each construct. As constructs were measured by multi-item scales, the value for each construct was computed

as the mean of the items (Gravetter & Forzano, 2012). The associated Cronbach's alpha values are also presented. The descriptions of the measurement of each of the constructs are articulated as the following.

3.5.3.1 Measurement of using SRL strategies

To measure SRL strategies, this study employed the Online Self-regulated Learning Questionnaire (OSLQ; Barnard et al., 2009), which is designed to assess the SRL strategies people use in the online and blended learning context. There are six subscales in the OSLQ, including goal setting, environment structuring, task strategies, time management, help seeking, and self-evaluation. The reliability and validity of the OSLQ have been tested in Barnard et al. (2009), with an average internal consistency ranging from 0.53 to 0.79, and reliability ranging from 0.67 to 0.90. It was used in past studies to compare students' SRL strategies use in blended and fully online courses (Barnard et al., 2009) and to help establish profiles of self-regulated learning (Barnard, Lan, & Paton, 2010). These studies have shown that OSLQ can be a reliable and valid instrument to measure SRL strategies used in the online context. As the context of this study is using social media for formal learning, this study contends that these strategies may also be used by students in this context. In this study, all items in OSLQ were adapted to suit the social media context. For this study, a total of 24 question items were used to assess the degree to which students engaged in certain SRL strategies while they voluntarily used social media for a course. A five-point Likert scale, ranging from "Strongly disagree" to "Strongly agree" was used on these questions. The value of items is summed and averaged to represent the extent to which students engage in certain SRL strategies. Higher scores on this scale indicate a higher level of using SRL strategies.

Principal component analysis with Promax rotation was carried out iteratively to determine the potential groupings of question items of SRL strategies (see Table 3.1). To ensure valid measurement, a total of six items of OSLQ were dropped during the analysis due to high cross loadings to multiple constructs. In particular, three items (i.e., "I compared with peer learners to find out how well I am using social media to support my study for the course/training", "I was persistent in getting help from other peer learners or experts or instructors

through social media tools”, and “When needed, I tried to communicate with other learners in a synchronous way in the form of face-to-face or through video conferencing or text chat”) were dropped due to their low loadings (less than 0.5), and three items (i.e., “I tried to schedule the same time every day or every week to study in social media, and I observed the schedule”, “I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the learning session) when I used social media for learning”, and “I kept a high standard for my learning in social media”) were dropped due to cross-loadings (less than 0.15) .

After dropping problematic items, four factors of SRL strategies emerged from the remaining 18 items, with eigenvalues greater than 1.00 explaining a total of 68.32% of the variance. Here, it should be noted that the items of three types of SRL strategies, i.e., task strategies, time management, and help seeking, were loaded together. This indicates that on the basis of users’ evaluations, these three SRL strategies are highly interrelated. Indeed, in Zimmerman’s (2000) conceptualization of self-regulated learning as three phases, task strategies, time management, and help seeking were categorized into the phase of performance control. That is, when people engage in actual task learning, they control their learning performance by using effective learning strategies, managing time effectively and get social assistance (Zimmerman, 1989). In the context of voluntary use of social media for formal learning in school, the data of this study suggested that the three strategies were not conceptually differentiated. Hence, in further analyses, task strategies, time management, and help seeking were combined as one variable and labeled as *performance control*, which describes the strategies that people enact during the actual learning process to regulate their performance. Consequently, the hypotheses about task strategies, time management, and help seeking were dropped, replaced by the hypothesis of the relationships between personal factors and performance control, and the hypothesis of the relationships between performance control and learning satisfaction in social media (see a summary of revised hypotheses in Table 3.3). Taken together, the four factors emerged from factor analyses correspond to goal setting, environment structuring, performance control, and self-evaluation. Table 3.1 shows the range of factors loadings of SRL strategies are from 0.64 to 0.95,

which meets the criterion for acceptable convergent validity. The remaining items for each construct are also presented in Table 3.1 and described as below.

- Goal setting. Goal setting is measured by strategies that reflect people's learning behaviors of making decisions on specific objective of learning. Three items were utilized to measure the use of goal setting strategies, with the mean of 3.73 ($SD = 0.92$, Cronbach $\alpha = 0.89$).

- Environment structuring. Environment structuring refers to students' efforts to seek a physical learning environment that is conducive to learning. There were four items to measure environment structuring and it has a mean of 3.77 ($SD = 0.88$, Cronbach $\alpha = 0.84$).

- Performance control. Performance control describes the strategies that people enact during the actual learning process to regulate their learning performance, including task strategies, time management, and help seeking. In particular, task strategies include actions that learners undertake to acquire knowledge such as rehearsing, elaborating, and organizing information. Time management refers to strategies that assist learners to manage their time effectively. Help seeking refers to people's behavior of identifying and calling upon social resources for assistance. On the basis of users' evaluations, these three SRL strategies are highly interrelated, which can be combined to manifest strategies that people use to control their performance in the process of actual learning (Barnard et al., 2010). In this vein, eight items were used to assess people's use of performance control strategies. The mean of the extent of using this type of strategy was 3.59 ($SD = 0.85$, Cronbach $\alpha = 0.90$).

- Self-evaluation. Self-evaluation refers to assessing learning outcomes according to a standard or a goal. When students evaluate their learning in social media, they monitor their progress towards attaining the goal. That is, they make evaluative judgments about their learning performance to ensure that learning goals can be accomplished. This construct was measured with three items with the mean value of 3.73 ($SD = 0.93$, Cronbach $\alpha = 0.84$).

Table 3.1 Measurement and Principal Component Analysis for SRL Strategies ($N = 192$)

Constructs and Items	Factor Loadings				M	SD	α
	1	2	3	4			
1. Performance control					3.59	0.85	0.90
I used social media to work on extra problems of my course/training to master the content.	0.87	-0.06	-0.08	-0.05	3.58	1.13	
I read aloud the learning materials in social media to fight against distractions.	0.86	-0.17	-0.01	-0.11	3.47	1.24	
I prepared my questions and thoughts when joining in an online discussion.	0.82	-0.10	0.01	0.02	3.64	1.08	
I tried to take more thorough notes when I was learning in social media because notes are even more important for learning in social media than in face-to-face learning.	0.72	0.00	0.03	0.10	3.66	1.01	
I connected with or follow someone who I thought knowledgeable in social media so that I could consult with him or her when I need help.	0.70	0.06	0.09	0.02	3.57	1.04	
I allocated extra studying time for my learning in social media because I knew it would be time-demanding.	0.69	0.11	0.04	0.06	3.61	1.05	
I shared my study problems in social media so that I could figure out what I was struggling with and how to solve my problems.	0.64	0.13	0.01	0.09	3.60	1.14	
Although the time to use social media for my learning was flexible, I still tried to distribute my studying time evenly across days.	0.64	0.22	-0.05	0.04	3.59	1.15	
2. Environment structuring					3.77	0.88	0.84
When I was using social media for learning, I would find a comfortable place to study.	-0.19	0.89	-0.06	0.10	3.78	1.04	
When I was using social media for learning, I chose a time with few distractions.	-0.09	0.88	0.01	0.06	3.77	1.20	

Table 3.1(continued) Measurement and Principal Component Analysis for SRL Strategies ($N = 192$)

When I was using social media for learning, I chose a place where I could avoid too much distraction.	0.09	0.79	0.04	-0.11	3.83	1.07	
When I was using social media for learning, I knew where I could study most efficiently.	0.17	0.75	0.00	-0.13	3.70	0.98	
3. Goal setting					3.73	0.92	0.88
I set standards for my learning in social media.	-0.03	0.03	0.95	-0.05	3.83	0.96	
I didn't compromise the quality of my learning because it was in social media.	0.04	-0.10	0.93	-0.01	3.77	0.98	
I set goals to help me manage study time when learning in social media.	-0.01	0.07	0.81	0.08	3.58	1.13	
4. Self-evaluation					3.73	0.93	0.84
I asked myself a lot of questions when learning about the materials in social media.	-0.09	0.02	0.07	0.89	3.80	1.05	
I summarized what I have learned in social media to examine my understanding.	0.06	-0.08	-0.01	0.86	3.72	1.00	
I compared with peer learners to find out the difference between my learning in social media and theirs.	0.07	0.02	-0.06	0.85	3.67	1.15	
Variance explained (%)	42.80	9.84	8.98	6.71			
Eigenvalue	7.70	1.77	1.62	1.21			

3.5.3.2 Measurement of personal factors

As discussed in Chapter 3, personal factors related to learning examined in this study are people's judgment of their self-efficacy for learning, intrinsic goal orientation, and value of the learning task. The items to measure these constructs were drawn from previous online learning studies (e.g., Pintrich, Smith, Garcia, & McKeachie, 1993; Scott, Mathieu, & Dennis, 1996) and then modified to suit the context of social media. In particular, four items were drawn from the motivated strategies for learning questionnaire (MSLQ; Pintrich et al., 1993) to measure self-efficacy for learning. Seven items were drawn from Pintrich et al. (1993) and Scott et al. (1996) and then modified to measure a learner's intrinsic goal orientation of the course in which they voluntarily used social media. Six items adapted from the MSLQ (Pintrich et al., 1993) were utilized to assess learners' perception of the value of the learning task (i.e., a course or a job training). Seven items were used to assess social media self-efficacy, which are modified from prior online learning research that examined computer self-efficacy (Chiu & Wang, 2008; Compeau & Higgins, 1995) and Internet self-efficacy (Kuo et al., 2014). Eight items were drawn from prior research on expectations of e-learning to measure learning outcome expectations for social media (Paechter & Maier, 2010). Four items were adapted from Internet Attitude Scale (Tsai, Lin, & Tsai, 2001) and the measurement of learning interest with social media (Aifan, 2015; Hong et al., 2016).

The principal component analysis using Varimax rotation was used to analyze the entire set of 36 items of personal factors. In total, 12 items were dropped because of low factors loadings or high cross loadings on multiple constructs. In particular, six items were dropped because of the low factor loadings (i.e., less than 0.5), including "I will be able to use what I learned in this course/training for future use", "I was trying hard to improve my learning by using social media", "Using social media would enable me to connect and communicate with knowledgeable users", "Using social media will help me to acquire skills of communication and cooperation", "When I was using social media to support my learning of this course/training, I could perform well on the learning activities in social media" and

“The opportunity to extend the range of my ability and knowledge about this course/training in social media is important to me”. The other six items were dropped due to high cross factor loadings (i.e., less than 0.15), including “The opportunity to extend the range of my ability and knowledge about this course/training in social media is important to me”, “Using social media would enable me to get easy and fast exchange of information and knowledge with peer learners”, “I was very interested in the content of this course/training”, “In the long run, I will be able to use what I learned in this course/training”, “I was confident I could facilitate my learning of this course/training by myself without the physical presence of an instructor to assist me”, and “The opportunity to learn new things about this course/training in social media was important to me”. The remaining 24 items fell into six groups with eigenvalues greater than 1.00 explaining a total of 77% of the variance, representing three personal factors related to learning and three factors related to social media use. Table 3.2 shows the range of personal factors’ loadings is from 0.52 to 0.90, which meets the criterion for acceptable convergent validity. The remaining items are also presented in Table 3.2 and described as below.

- Self-efficacy for learning. Self-efficacy for learning was assessed by asking participants to rate their agreement on four statements about their judgments of their capability to accomplish the learning of a course on a 5-point Likert-scale ranging from 1 (strongly disagree) to 5 (strongly agree). There are three items to measure self-efficacy for learning and the mean is 3.78 ($SD = 0.87$, Cronbach $\alpha = 0.87$).

- Intrinsic goal orientation. The intrinsic goal orientation scale measures the degree to which an individual agrees that his or her reason of learning is to master the learning subject. There are four items to measure intrinsic goal orientation and the mean of the four items is 3.85 ($SD = 0.88$, Cronbach $\alpha = 0.90$).

- Task value. Task value concerns a student’s judgment of how interesting, useful, and important a learning task was. There are three items to measure task value and the mean of the index is 3.84 ($SD = 0.78$, Cronbach $\alpha = 0.88$).

Personal factors related to social media use are people's judgment of their self-efficacy, learning outcome expectations for social media, and attitude toward using social media for learning. Three factors were reflected from the principal component analysis: self-efficacy for learning, intrinsic goal orientation, and task value. Table 3.2 presents the results of principal component analysis.

- **Social media self-efficacy.** Social media self-efficacy refers to students' self-perceived confidence in their ability to use social media technologies for learning tasks. As suggested by Compeau and Higgins (1995), self-efficacy is not concerned with what one has done or what one wants to do, but rather with judgments of what could be done in the future. In terms of technology self-efficacy, it does not refer to the use of specific technological skills, but rather judgments of the ability to use technology in the accomplishment of a task, which is related to learning in this study. Five items were used to assess social media self-efficacy. The mean of the index is 3.85 ($SD = 0.85$, Cronbach $\alpha = 0.94$).

- **Learning outcome expectations for social media.** The learning outcome expectations scale measures a learner's belief that using social media will help him or her to gain learning achievements (Chen et al., 2013). Participants rated their agreement on four statements about learning outcomes, using a 5-point Likert-scale from 1 (strongly disagree) to 5 (strongly agree). The score of learning outcome expectations for social media was the mean of the four-item values, which is 3.82 ($SD = 0.74$, Cronbach $\alpha = 0.90$).

- **Attitude.** Attitude towards using social media for learning is measured by an individual's evaluation of using social media as learning tools (Lawanto et al., 2014). The mean of the four valid items is 3.85 ($SD = 0.83$, Cronbach $\alpha = 0.89$). A higher average score suggests a more favorable attitude towards using social media for learning.

Table 3.2 Measurement and Principal Component Analysis of Personal Factors ($N = 192$)

Constructs and Items	Factor Loadings						<i>M</i>	<i>SD</i>	α
	1	2	3	4	5	6			
1. Social media self-efficacy							3.85	0.85	0.94
I could use a new social media tool for learning if I had seen someone else using it before trying it myself.	0.90	0.08	0.12	0.15	0.08	0.07	3.82	0.99	
I could use a new social media tool for learning even if there is no one around to tell me what to do as I go.	0.90	0.10	0.14	0.14	0.11	0.09	3.81	1.01	
I could use a new social media tool for learning if I could ask someone for help when I got stuck.	0.85	0.07	0.16	0.10	0.10	0.07	3.82	0.97	
I could use a new social media tool for learning even if I had never used it before.	0.80	0.03	0.32	0.05	0.10	0.10	3.92	0.99	
When I was using social media for learning, I was confident that I could get information needed for this course/training.	0.78	0.21	0.15	0.09	0.10	0.13	3.89	0.89	
When I was learning in social media, I was confident that I could access appropriate support from other users.	0.766	0.18	0.209	0.011	0.116	0.083	3.83	0.92	
2. Intrinsic goal orientation							3.85	0.88	0.90
The most satisfying thing for me when learning in social media for this course/training was trying to understand the learning materials as thoroughly as possible.	0.13	0.84	0.10	0.06	0.04	0.08	3.78	0.99	
I used social media for this course/training because I preferred some materials that really challenged me so I could learn new things.	0.14	0.83	0.18	0.10	0.07	0.20	3.82	1.00	

Table 3.2(continued) Measurement and Principal Component Analysis of Personal Factors ($N = 192$)

I enjoyed acquiring useful knowledge or skills related to the course/training in social media, even if there was no reward (e.g., a good grade, credit, or a diploma) or approval from others.	0.14	0.79	0.19	0.18	0.32	0.05	3.88	1.04	
I learned in social media because I preferred materials that aroused my curiosity, even if it was difficult to learn.	0.14	0.74	0.23	0.22	0.33	0.08	3.91	1.01	
3. Attitude							3.85	0.83	0.89
I look forward to learning tasks that require me to use social media.	0.26	0.24	0.79	0.13	0.20	0.06	3.82	0.92	
I will get bored quickly when using social media for learning.	0.28	0.13	0.76	0.18	0.13	0.03	3.83	1.00	
Using social media for learning will be frustrating for me.	0.23	0.15	0.75	0.25	0.14	0.14	3.78	1.01	
I like using social media for learning.	0.31	0.27	0.73	0.14	0.18	0.18	3.96	0.89	
4. Learning outcome expectation							3.82	0.74	0.82
Using social media would help me to acquire conceptual knowledge.	0.03	0.18	0.11	0.88	0.18	0.13	3.76	0.92	
Using social media would help me to acquire skills regarding how to manage my learning.	0.00	0.18	0.12	0.84	0.09	0.13	3.89	0.86	
Using social media would help me to acquire technology-related skills for learning.	0.28	0.06	0.24	0.69	0.06	0.16	3.79	1.02	
Using social media would help me to apply my knowledge to solve different problems.	0.38	0.04	0.22	0.52	0.18	0.05	3.85	0.89	

Table 3.2(continued) Measurement and Principal Component Analysis of Personal Factors ($N = 192$)

5. Self-efficacy for learning							3.78	0.87	0.87
I was confident I could do an outstanding job on all the learning tasks related to this course/training in social media.	0.11	0.17	0.14	0.09	0.89	0.07	3.83	1.00	
I was certain I could understand the most difficult material presented in social media that was related to this course/training.	0.15	0.13	0.17	0.13	0.87	0.06	3.68	0.97	
Even in the face of learning difficulties related to this course/training, I was certain I could overcome it in the process of learning.	0.17	0.20	0.16	0.18	0.72	0.04	3.82	0.94	
6. Task value							3.84	0.78	0.88
It was important for me to do well in this course/training.	0.19	0.18	0.17	0.15	0.01	0.88	3.81	0.87	
I liked the subject matter of this course/training.	0.20	0.22	0.16	0.16	0.06	0.87	3.76	0.88	
It was important for me to learn well in this course/training.	0.03	-0.01	-0.01	0.10	0.09	0.82	3.94	0.85	
Variance explained (%)	20.44	12.82	12.15	10.95	10.60	10.10			
Eigenvalue	9.41	2.76	2.03	1.68	1.39	1.23			

3.5.3.3 Measurement of learning satisfaction in social media

Learning satisfaction in social media refers to a positive affective learning outcome that results from the evaluation of a learning experience. The 6 items to measure these constructs were drawn from previous online learning studies (Hong et al., 2016; Piccoli et al., 2013) and then modified to suit the context of the present study. Respondents were asked to indicate how satisfied they are with the learning experience in which they voluntarily use social media to support the study of a recent course in school. These items were measured by a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A principal component analysis using Varimax rotation was executed on the 6 items. All items were loaded together as one variable, named “Learning satisfaction in social media” ($M = 3.33$, $SD = 0.16$, Cronbach $\alpha = 0.93$). Table 3.3 shows the range of factor loadings of learning satisfaction in social media are from 0.65 to 0.76, which meets the criterion for acceptable convergent validity. The items are presented in Table 3.3.

Table 3.3 Measurement and Principal Component Analysis of Learning Satisfaction ($N=192$)

Constructs and Items	Factor Loadings	<i>M</i>	<i>SD</i>	<i>α</i>
Learning satisfaction in social media		3.33	0.16	0.79
I enjoyed my use of social media for this course/training.	0.76	3.16	1.05	
Overall, social media has met my learning expectations.	0.73	3.36	0.96	
I am satisfied with my learning experience of using social media.	0.72	3.16	1.01	
By using social media for this course/training, I have solved the learning problems I had.	0.68	3.43	0.95	
By using social media for this course/training, I have acquired knowledge and skills I need.	0.65	3.57	0.95	
The learning experience in social media stimulated my desire to learn.	0.65	3.27	0.88	
Variance explained (%)	49.08			
Eigenvalue	2.95			

3.5.4 Data Collection

After obtaining the IRB approval, data of Study 1 was collected from April to June in 2016. The recruitment was conducted through emails, social media, in-class advertisements, and poster advertisements. Participation in the survey was completely anonymous and voluntary. Before answering the questionnaire, all participants were presented with a consent form including an introduction of the purpose of the study, privacy and confidentiality of the participation. The entire survey lasted approximately 30 minutes to complete.

A mixed-mode survey was conducted, in which both online and paper-based surveys were administered to collect data. In particular, participants who chose to access the survey through web browsers on any electronic devices were provided with the link of the online questionnaire; participants who chose to engage in a paper-based survey were provided with the printed questionnaire. By offering more than one mode of data collection, it is more likely to get valid responses from the population of interest and to increase response rates (Dillman et al., 2014). Research has also suggested that respondents have various preferences for different modes of survey data collection (Hox et al., 2015). Thus, the mixed-mode survey has been increasingly used in many studies to achieve good response rates (e.g., Bradley & Sankar, 2003; Natalie et al., 2018; Starr et al., 2019).

The disadvantages of mixed-mode surveys are the measurement errors that may be caused by mode differences. Hox et al. (2015) summarized two types of errors of mode effects: errors caused by survey design and implementation such as format question formats in different modes, and errors caused by inherent mode differences such as the differences between visual and aural presentations. However, research has suggested that these errors can and should be avoided in the design phase (De Leeuw et al., 2008; Hox et al., 2015). Regarding this, this study followed the uni-mode design, as advocated by Dillman et al. (2014), where the question formats and layout in both online and paper-based survey were kept unified to minimize the mode differences. In addition, all questions were presented to the respondent visually, thus avoiding potential bias in interpreting the questions in different modes. In total, there were 302 responses collected, including 98 responses from the online survey and 204 responses from the paper-

based survey. One-way ANOVA comparison of means was conducted to compare online and paper-based data collection (Schillewaert & Meulemeester, 2005). The results indicated no significant differences in measurement between data collected from the paper-based and online survey at the $p < .05$ level ($F(1, 300) = 1.10, p = 0.296$).

3.5.5 Statistical Analyses

For the hypotheses testing, the statistical analysis consists of the following steps.

First, correlations among the independent variables were examined. To avoid multicollinearity, all correlations coefficients should be below the recommended threshold of 0.70 (Tabachnick & Fidell, 2001).

Next, Hypothesis 1 to Hypothesis 6 in the conceptual model for Study 1 were tested through hierarchical linear regression analysis. Hierarchical regression is employed because it is a flexible statistical technique that simultaneously examines the effects of multiple independent variables on one dependent variable (Cohen et al., 2003). In addition, using hierarchical regression techniques, the researcher can enter sets of variables into blocks in a predetermined order as dictated by the logic of the research (Cohen, Cohen, West, & Aiken, 2003). In this way, hierarchical regression allows researchers to examine the unique contributions of each block in explaining the variance of the dependent variable (Tabachnick & Fidell, 2007). As this research investigates two categories of personal factors and seeks to understand whether personal factors related to social media use may contribute an extra explanation to people's behavior of using SRL strategies when voluntarily using social media for learning, hierarchical regression analysis can help to achieve this objective. Moreover, because this research attempted to uncover the extent the personal factors related to social media use may complement personal factors related to learning to explain people's use of SRL strategies in the context of voluntary use of social media for formal learning in school, the personal factors related to learning is entered into the first block, followed by the entry of personal factors related to social media use into the second block.

Finally, Hypothesis 7 in the conceptual model for Study 1 was tested though a simultaneous multiple regression, in which learning satisfaction in social media was the dependent variable and four types of SRL strategies were the independent variables.

3.6 Results

This section presents the results of the data analyses with respect to the hypotheses proposed in Study 1 and is divided into two sections: descriptive statistics and hypotheses testing.

3.6.1 Descriptive Analysis

A total of 302 respondents completed the survey. Responses were removed if the respondents chose a course that was in the context of the workplace and their use of social media for the course was partially or fully compulsory. After removing cases that did not fit in the context of voluntarily using social media for formal learning in school, this study obtained 192 valid responses for further data analyses. Among the 192 valid responses, missing data were less than 5%. To handle the missing values, the missing data of any variable in the dataset were replaced by the mean of the observations that are non-missing. The advantage of using mean imputation as the missing data handling method is maintaining the sample size and the sample means of the variables. But replacing missing data with the mean may lead to bias in the variance and standard error of the variable and its correlation with other variables. However, this problem can be mitigated by a larger sample size and a small proportion of missing data. As suggested in research (Cheema, 2014; Eekhout et al., 2014), mean imputation could work well as other imputation methods, such as multiple imputation, maximum likelihood imputation, listwise deletion, and regression imputation, with the percentage of missing data less than 10% and sample size larger than 50. As there were less than 5% missing data in 192 observations, the mean imputation is deemed as appropriate in handling missing data in the present study.

Of all of the respondents, 85 were men and 107 were women, with ages ranging from 18 to 35 ($M = 22.9$, $SD = 2.66$). From the sample, the majority of the respondents were pursuing an academic degree of Bachelor or above, with

6.7% ($n = 13$) were working for a degree lower than Bachelor, 46.1% ($n = 89$) for Bachelor, 26.9% ($n = 52$) for Master, and 20.2% ($n = 39$) for Doctorate Degree. About 77.6% ($n = 149$) had an educational background in computer science/IT, engineering, or arts, humanities, social sciences, while the rest of participants (22.4%, $n = 43$) were from business, medicine, education and so on. The demographics of the respondents are summarized in Table 3.4.

Table 3.4 Sample Demographics ($N = 192$)

Demographic variable	Count	%
Gender		
Men	85	44.2
Women	107	55.3
Age		
18- 25	114	59.4
26-30	54	28.1
31 or over	24	12.5
Highest academic degree attained		
Degree Lower than Bachelor	112	58.3
Bachelor's Degree	59	30.7
Master's Degree	21	10.9
Current academic status		
Degree Lower than Bachelor	13	6.7
Bachelor's Degree	89	46.1
Master's Degree	52	26.9
Doctorate Degree	39	20.2
Educational Background		
Computer science/IT	65	33.9
Engineering	28	14.6
Arts, humanities, social sciences	56	29.2
Others	43	22.4

Most of the courses (63.7%, $n = 122$) in which respondents voluntarily use for formal learning in school were via a blended format, with the lengths vary from less than 1 week to more than 3 months (see Table 3.5). Among the social media technologies utilized by respondents (Figure 3.2), the results showed that multimedia-sharing social media (e.g., YouTube, Instagram, SlideShare) were used by 71% of the respondents ($n = 136$), followed by Wikis (e.g., Wikipedia) (60%, $n = 115$) and Web-based (cloud-computing) office tools (e.g., Google Doc, Calendar sharing) (50%, $n = 96$). Meanwhile, the most frequently engaged learning activities (Figure 3.3) are searching learning materials ($M = 3.57$, $SD = 1.16$), networking with other users ($M = 3.43$, $SD = 1.07$), and learning from the materials (e.g., videos, audios, text, graph) ($M = 3.06$, $SD = 1.30$).

Table 3.5 Characteristics of Course Learning ($N = 192$)

Context	Count	%
Learning Format		
Both online and traditional face-to-face	122	63.7
Only online	70	36.3
Learning Length		
Less than 1 week	28	14.6
1 week- Less than 1 month	37	19.3
1-3 months	77	40.1
More than 3 months	50	26.0

Figure 3.2 Types of social media used for formal learning in school ($N = 192$)

Figure 3.3 Means of frequencies of learning activities in social media ($N = 192$)

3.6.2 Hypotheses Testing

As revealed in the principal component analysis (see section 3.5.3.1), the items of three types of SRL strategies, i.e., task strategies, time management, and help seeking, were loaded together and thus combined as performance control in our analysis. Consequently, the hypotheses developed in Study 1 were revised, as shown in Table 3.6.

Table 3.6 Summary of Revised Hypotheses

Hypothesis	
Influences of personal factors related to learning	
Hypothesis 1:	A student with higher self-efficacy for learning is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Hypothesis 2:	A student with higher intrinsic goal orientation is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Hypothesis 3:	A student with higher task value is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Influences of personal factors related to social media use	
Hypothesis 4:	A student with higher social media self-efficacy is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Hypothesis 5:	A student with higher learning outcome expectations for social media is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Hypothesis 6:	A student with more positive attitude towards using social media for learning is more likely to use SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, when voluntarily using social media to support formal learning in school.
Effects on learning satisfaction in social media	
Hypothesis 7:	The extent to which people engage in SRL strategies, in terms of (a) goal setting, (b) environment structuring, (c) performance control, (d) self-evaluation, is positively associated with their learning satisfaction in social media when voluntarily using social media to support formal learning in school.

As in Table 3.7, the correlations between IVs indicates that correlations were less than 0.70 (Cohen et al., 2013). Variance inflation factors (VIF) were

also examined to checked if there is multicollinearity. The VIF values ranged from 1.2 to 1.5. As the VIF was less than the recommended value of 5, multicollinearity is not an issue in this study (Hair et al., 2010).

Table 3.7 Correlation among Independent Variables (Pearson)

Independent variables	1	2	3	4	5	6
1. Self-efficacy for learning	1					
2. Intrinsic goal orientation	.462**	1				
3. Task value	.211**	.332**	1			
4. Social media self-efficacy	.339**	.359**	.312**	1		
5. Learning outcome expectations for social media	.387**	.403**	.367**	.394**	1	
6. Attitude	.456**	.515**	.336**	.558**	.512**	1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

To test the hypotheses in the conceptual model, four hierarchical regression analyses were carried out to examine the influences of personal factors on the use of SRL strategies, and a simultaneous multiple regression was conducted to examine the effects of using SRL strategies on learning satisfaction in social media.

On the one hand, to uncover the personal factors that be significantly related to the use of SRL strategies, each of four SRL strategies (i.e., goal setting, environment structuring, performance control, and self-evaluation) was regressed on all personal factors in the conceptual model. For example, to examine the influential factors of goal setting, goal setting was entered as the dependent variable. Next, personal factors related to learning were entered as the first block, and personal factors related to social media use were entered as the second block. The other three SRL strategies were also analyzed in the same way. The results are presented in Table 3.8.

On the other hand, to examine whether the use of SRL strategies could be significantly associated with people's satisfactions with learning in social media, this study conducted a multiple regression analysis. Specifically, the four SRL strategies were entered as independent variables while learning satisfaction with social media was the dependent variable. The results are presented in Table 3.9.

The results of the analyses of all hypotheses are described as below. First, regarding goal setting, all personal factors accounted for 39% of the variance in goal setting (Adjusted $R^2 = .39$, $F(6, 185) = 21.60$, $p < 0.001$). In particular, personal factors related to learning explained 29% of the variance in goal setting, while personal factors related to social media use contributed 10% of increasing variance to the explanation of using goal setting strategies. Among the predictors, intrinsic goal orientation and attitude towards using social media for learning demonstrated stronger influence, followed by social media self-efficacy.

Second, in terms of the model for environment structuring, it was also found to be statistically significant (Adjusted $R^2 = .35$, $F(6, 185) = 18.29$, $p < 0.001$), which explained 24% of the variance in using the strategy of environment structuring when learning in social media. Specifically, personal factors related to learning accounted for 11% of the variance in environment structuring. The influential predictors were the attitude towards using social media for learning, self-efficacy for learning, and learning outcome expectations for social media.

Third, it was found that the model of personal factors influencing performance control was also statically significant (Adjusted $R^2 = .41$, $F(6, 185) = 23.32$, $p < 0.001$), which accounted for 41% of the variance in using task strategies. Both personal factors related to learning and personal factors related to social media use significantly accounted for the variance of the dependent variable, with 23% and 18% respectively. The variables found to predict the use of task strategies were intrinsic goal orientation, task value, social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning.

Fourth, regarding self-evaluation, all personal factors explained 30% of the variance in self-evaluation (Adjusted $R^2 = .29$, $F(6, 185) = 14.00$, $p < 0.001$). Both personal factors related to learning and personal factors related to social media use significantly accounted for the variance of the dependent variable, with 16% and 13% respectively. Personal factors related to social media use, i.e., social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning, were significant predictors. The results of hierarchical regression analyses to examine the influential factors of using SRL strategies are presented in Table 3.8.

Table 3.8 Summary of Hierarchical Regression Analysis ($N = 192$)

Independent Variables	Dependent variables – The extent of using SRL strategies							
	Goal Setting		Environment Structuring		Performance Control		Self-evaluation	
	Standardized Beta	t-values	Standardized Beta	t-values	Standardized Beta	t-values	Standardized Beta	t-values
First block: personal factors related to learning								
Self-efficacy for learning	.07	1.02	.23**	3.27	-.01	-.19	.02	.33
Intrinsic goal orientation	.23**	3.33	.05	.69	.23**	3.26	.13	1.71
Task value	.02	0.39	-.07	-1.07	-.15*	-2.40	-.07	-1.02
Incremental Adjusted R^2	.29***		.24***		.23***		.16***	
Second block: personal factors related to social media use								
Social media self-efficacy	.15*	2.15	.02	.23	.16*	2.39	.15*	2.03
Learning outcome expectations for social media	.09	1.30	.17*	2.36	.24***	3.58	.19*	2.57
Attitude	.27**	3.45	.34***	4.11	.28***	3.63	.25**	2.95
Incremental Adjusted R^2	.10***		.11***		.18***		.13***	
Total Adjusted R^2 (%)	.39***		.35***		.41***		.29***	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Finally, regarding the effects of SRL strategies use on learning satisfaction in social media, the use of all four types of SRL strategies explained 53% of the variance in learning satisfaction in social media (Adjusted $R^2 = .53$, $F(4, 187) = 5.15$, $p < 0.001$). All four types of SRL strategies, in terms of goal setting, environment structuring, performance control, and self-evaluation, were found to be significant predictors of learning satisfaction in social media. The results of simultaneous multiple regression are presented in Table 3.9.

Table 3.9 Summary of Simultaneous Multiple Regression Analysis ($N = 192$)

Independent Variables	Dependent variable – Learning satisfaction in social media	
	Standardized Beta	t-values
Goal setting	.28***	4.52
Environment structuring	.27***	4.67
Performance control	.18**	2.80
Self-evaluation	.21**	3.50
Total Adjusted R^2 (%)	.53***	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

3.6.2.1 The Influences of personal factors related to learning

Personal factors related to learning (i.e., self-efficacy for learning, intrinsic goal orientation, and task value) were found to demonstrate significant influences on the use of SRL strategies in terms of goal setting, environment structuring, and performance control.

Among the three personal factors related to learning examined in this study, intrinsic goal orientation exerted the strongest influence on people's SRL behavior by predicting the use of SRL strategies in terms of goal setting ($\beta = .29$, $p < .01$), and performance control ($\beta = .27$, $p < .01$). In this vein, hypotheses 2(a) and 2(c) were supported. This indicates that people who have higher levels of intrinsic goal orientation are more likely to use SRL strategies in terms of goal setting and performance control. Contrary to expectation, there was no significant influence of

intrinsic goal orientation on environment structuring ($\beta = .05, p = .49$). Meanwhile, intrinsic goal orientation was not significantly related to self-evaluation ($\beta = .13, p = .09$). This means that intrinsic goal orientation is not associated with people's use of environment structuring and self-evaluation strategies when learning in social media.

Next, self-efficacy for learning was found to be a significant predictor of environment structuring ($\beta = .23, p < 0.01$). However, there were no significant relationships found between self-efficacy for learning and the use of SRL strategies in terms of goal setting ($\beta = .07, p = .31$), performance control ($\beta = -.01, p = .85$), and self-evaluation ($\beta = .02, p = .74$). Thus, hypotheses 1(a), 1(c), 1(d) were rejected. This reveals that people's self-efficacy for learning is not an influential predictor for people's use of SRL strategies of goal setting, performance control and self-evaluation when voluntarily using social media for formal learning in school.

Lastly, contrary to the expectations of Hypothesis 3(c), task value was significantly negatively associated with performance control ($\beta = -.15, p < .05$), indicating that a student with more value on their learning task were less likely to use SRL strategies of performance control strategies. Meanwhile, Hypothesis 3(a), 3(b), 3(d) were rejected because no significant relationships were found between task value and goal setting ($\beta = .02, p = .70$), environment structuring ($\beta = -.07, p = .29$), and self-evaluation ($\beta = -.07, p = .31$). This means that the use of SRL strategies in terms of goal setting, environment structuring, and self-evaluation were not influenced by people's value towards the learning task they are engaged in.

3.6.2.2 The Influence of personal factors related to social media use

This research extended the social cognitive model of SRL in the learning context of social media by positing that personal factors related to social media use may also influence the use of SRL strategies. In the block 2 of every model for the subscales of SRL strategies, personal factors related to social media use, including social media self-efficacy, learning outcome expectations for social media, and attitude, were entered into the regression analysis. It was found that personal factors related to social media use contributed to the significant increase in adjusted R^2 to

explain the variance in the use of all four SRL strategies, goal setting, environment structuring, performance control, and self-evaluation in particular. A summary of the hypotheses testing results is presented in Table 3.10.

Among the three personal factors related to social media use examined in this study, attitude towards using social media for learning was found to exert influence on people's use of all SRL strategies, i.e., goal setting ($\beta = .27, p < .01$), environment structuring ($\beta = .34, p < .001$), performance control ($\beta = .28, p < .001$), and self-evaluation ($\beta = .25, p < .01$), which means Hypothesis 6(a), 6(b), 6(c), 6(d) were all supported. This suggests that people who had more favorable attitude towards using social media for learning were more likely to engage in SRL strategies to facilitate their learning in social media.

In addition, with regard to social media self-efficacy, the results showed that there were significant associations between social media self-efficacy and the use of SRL strategies of goal setting ($\beta = .15, p < 0.05$), performance control ($\beta = .16, p < 0.05$), and self-evaluation ($\beta = .15, p < 0.05$). In this vein, Hypothesis 4(a), 4(c), 4(d) were all supported. This means students with higher level of social media self-efficacy were more likely to employ SRL strategies of goal setting, performance control and self-evaluation. However, there was no significant relationship found between social media self-efficacy and environment structuring ($\beta = .02, p = .82$).

Finally, learning outcome expectations for social media were also found to be positively associated with environment structuring ($\beta = .17, p < .05$), performance control ($\beta = .24, p < 0.001$), and self-evaluation ($\beta = .19, p < 0.05$). This suggests that a student with learning outcome expectations for social media is more likely to engage in SRL strategies of environment structuring, performance control, and self-evaluation when voluntarily using social media for formal learning in school. However, Hypothesis 5(a) were rejected because of the non-significant effects of learning outcome expectations for social media on goal setting ($\beta = .09, p = 0.20$).

3.6.2.3 The Effects on learning satisfaction in social media

Regarding the effects of using SRL strategies on learning satisfaction in social media when students voluntarily use social media to support formal learning in school, all four types of SRL strategies, i.e., goal setting ($\beta = .28, p < .001$), environment structuring ($\beta = .27, p < .001$), performance control ($\beta = .18, p < .01$), and self-evaluation ($\beta = .21, p < .01$), were found to be significant predictors of learning satisfaction in social media, which means Hypothesis 7(a), 7(b), 7(c), 7(d) were supported.

Taken together, Table 3.10 presents a summary of the hypotheses testing results.

Table 3.10 Results of Hypotheses Testing

Hypothesis	Independent Variable	Dependent Variable	Result
Hypothesis 1(a)	Self-efficacy for learning	Goal setting	Not supported
Hypothesis 1(b)		Environment structuring	Supported
Hypothesis 1(c)		Performance control	Not supported
Hypothesis 1(d)		Self-evaluation	Not supported
Hypothesis 2(a)	Intrinsic goal orientation	Goal setting	Supported
Hypothesis 2(b)		Environment structuring	Not supported
Hypothesis 2(c)		Performance control	Supported
Hypothesis 2(d)		Self-evaluation	Not supported
Hypothesis 3(a)	Task value	Goal setting	Not supported
Hypothesis 3(b)		Environment structuring	Not supported
Hypothesis 3(c)		Performance control	Not supported
Hypothesis 3(d)		Self-evaluation	Not supported
Hypothesis 4(a)	Social media self-efficacy	Goal setting	Supported
Hypothesis 4(b)		Environment structuring	Not supported
Hypothesis 4(c)		Performance control	Supported
Hypothesis 4(d)		Self-evaluation	Supported
Hypothesis 5(a)	Learning outcome expectations for social media	Goal setting	Not supported
Hypothesis 5(b)		Environment structuring	Supported
Hypothesis 5(c)		Performance control	Supported
Hypothesis 5(d)		Self-evaluation	Supported
Hypothesis 6(a)	Attitude	Goal setting	Supported
Hypothesis 6(b)		Environment structuring	Supported
Hypothesis 6(c)		Performance control	Supported
Hypothesis 6(d)		Self-evaluation	Supported

Table 3.10(continued) Results of Hypotheses Testing

Hypothesis 7(a)	Goal setting	Learning satisfaction in social media	Supported
Hypothesis 7(b)	Environment structuring		Supported
Hypothesis 7(c)	Performance control		Supported
Hypothesis 7(d)	Self-evaluation		Supported

3.7 Discussion

This section discusses the results of Study 1, which investigated the influences of personal factors on the extent to which SRL strategies are employed when students voluntarily use social media for formal learning in school, as well as the effects of using SRL strategies on their learning satisfaction in social media. In particular, four types of SRL strategies have been revealed in the data. The SRL strategies are goal setting, environment structuring, performance control, and self-evaluation. First, the use of goal setting strategies is found to be influenced by intrinsic goal orientation, social media self-efficacy, and attitude towards using social media for learning. Second, the use of environment structuring strategies is found to be influenced by self-efficacy for learning, learning outcome expectations for social media, and attitude towards using social media for learning. Thirdly, the use of performance control strategies was revealed to be influenced by intrinsic goal orientation, learning outcome expectations, and attitude towards using social media for learning. Fourth, the use of self-evaluation strategies is influence by social media self-efficacy, learning outcome expectations, and attitude. Last but not least, the use of all four SRL strategies is identified to be significant predictors of learning satisfaction when people voluntarily use social media for formal learning in school.

3.7.1 *The Influences of Personal Factors Related to Learning*

Drawing on social cognitive theory and related empirical research on SRL, this study investigated three personal factors related to learning, i.e., self-efficacy for learning, intrinsic goal orientation, and task value, and their influence on the extent

of using SRL strategies when they voluntarily use social media for formal learning in school.

The most salient personal factor related to learning that was found to influence people's use of SRL strategies was intrinsic goal orientation, which reflects that an individual's purpose of engaging in a learning task is to the mastery of the task, increasing competence, and making progress. Specifically, the results indicated that students with higher intrinsic goal orientation would be more likely to engage in SRL strategies of goal setting and performance control when they voluntarily use social media for formal learning in school. Consistent with prior research, these findings showed that intrinsic goal orientation could predict a learner's engagement in SRL strategies in the online formal learning in school (Cho & Shen, 2013) and web-based job training at work (Wan et al., 2012). One possible explanation for why people with high intrinsic goal orientation are more self-regulated could be derived from models of goal orientation (Pintrich, 2000), which suggest that students who have higher intrinsic goal orientations tend to be more motivated to set progressive goals for their learning so as to make progress toward their goal of mastery. In this light, when people voluntarily use social media to support the study of a course in school, those with higher intrinsic goal orientation will care more about the learning process and set goals to make sure they master the course-related knowledge. In addition, when students learn in social media, they are physically separated from peers and instructors. In this vein, when encountering challenges, a student with higher intrinsic goal orientation are also more likely to take on the challenges control their performance through effective learning strategies, time management, and help seeking, when they are voluntarily using social media for formal learning.

However, the data suggest no significant effect of intrinsic goal orientation on the use SRL strategies of environment structuring and self-evaluation. Similar to results of Wan et al. (2012) in web-based job training, no significant association was found between intrinsic goal orientation and SRL strategies requiring social interactions. One possible explanation for this can be that individuals with an intrinsic goal orientation enjoy the challenges in the learning process and thus more likely to engage in personal learning activities, such as setting learning goals and

controlling their performance to achieve these goals (Wan et al., 2012). On the other hand, when students voluntarily use social media to support formal learning in school, they are more likely to connect with peer students and engage in social forms of learning such as comparing with peer learners to evaluate their learning performance. Moreover, Pintrich (2000) suggested that those with high intrinsic goal orientation were more focused on their learning.

The intrinsic goal orientation was found to be not significantly associated with using SRL strategies of environment structuring. A possible explanation can be the incomplete measurement of environment structuring in this study, which was adapted from past research on online course learning and mainly focused on learners' efforts to arrange their physical surroundings to reduce distractions and interruption. Although this measurement of environment structuring has been widely employed and tested in both traditional and online learning context and was deemed as an important SRL strategies, it may not capture the whole picture of the learning environment mediated by social media. That is, when social media are used for learning, distractions may come from not only the physical environment but also the social activities in the social media environment, such as system notifications and online friends' updates. Hence, for future studies, the measures of environment structuring in the social media learning context may include the structuring of social media environment for learning. An example of the measuring the environment structuring in social media can be "When studying, I log out my Facebook account or close instant message software, so that I can focus on my work", which was used in Wu (2015) to investigate the influence of people's Internet self-efficacy on their regulation of attention when learning in social media. Hence, it is possible that intrinsic goal orientation may be more influential in affecting people's SRL strategies of structuring online environment instead of the physical environment measured in this study.

The present study also found that those who have high self-efficacy for learning were more likely to engage in environment structuring. This indicates that people who are more confident with their capability to learn are more motivated to arrange their surroundings with fewer distractions. According to social cognitive

theory, one source of people's self-efficacy was their prior experience (Bandura, 2001a). It is thus possible self-efficacious learners are more experienced in finding a learner-friendly environment to facilitate their learning. Unexpectedly, self-efficacy for learning was found to be not significantly associated with the use of SRL strategies in terms of goal setting, performance control, and self-evaluation. These findings are surprising, since self-efficacy for learning has been identified in prior research as a predictor of using these SRL strategies in an either traditional or online context (Moos & Azevedo, 2009). This suggested that the factors that influence the use of SRL strategies can be very different in the context of voluntary use of social media for formal learning. According to the social cognitive model of SRL, "self-regulated learners are more self-efficacious for learning than are students with poorer self-regulatory skills; the former believe that they can use their self-regulatory skills to help them learn" (Schunk, 2005, p. 87). One possible explanation for the non-significant effect of self-efficacy for learning on these SRL strategies can be that voluntary use of social media for learning is different from mandatory use of a learning system in many online learning studies. In particular, most online course learning research more emphasized how students internalized the content delivered via these learning technologies. In this context, a student with higher self-efficacy for learning was more likely to report using SRL strategies to acquire the knowledge delivered (Zimmerman & Kitsantas, 2014). However, voluntary use of social media for learning involves not only interactions between learner and content, but also interactions between learner and various social media technologies and even interactions among unknown users. In this vein, learners are required to be more efficacious of using social media for learning, rather than just being efficacious of what they will learn. Put differently, it is possible that the influence of self-efficacy for learning can be mitigated by the influence of social media self-efficacy. Indeed, as will be elaborated later in Section 3.7.2, social media self-efficacy was found to be a conspicuous predictor of people's use of SRL strategies in terms of goal setting, performance control, and self-evaluation. This finding highlighted that the role of personal factor such as self-efficacy in a social media learning environment seems to be more complicated and need to be investigated in a more nuanced fashion.

Contrary to expectation, task value was observed to be negatively related to the use of SRL strategies of performance control, which means that individuals were less likely to engage in performance control strategies, even though they have high task value. This finding is surprising as past research suggests that in online course learning contexts, the extent to which students value a course can influence the extent to which students initiate and sustain cognitive and metacognitive engagement in learning (e.g., Lawanto et al., 2014). One possible explanation for the contrary results obtained in this study can be that people who put a higher value on a course may be more serious about their learning. Thus, people may be less likely to voluntarily use social media for learning activities; rather, they may be more likely to engage in offline formal learning such as face-to-face discussions and classroom tutoring. Moreover, some research has suggested that social activities in social media that are not related to learning can be a challenge for some students to keep focus when they engage in learning in social media (Wu, 2015). Thus, it is possible that those who have a higher value on a course may be less likely to learn on social media, let alone employ any SRL strategies when learning in social media. If so, this can also explain why task value is not related to the use of other SRL strategies examined in this study, including goal-setting, environment structuring, and self-evaluation. Additionally, it is also possible that task value may exert a positive influence on the use of combined SRL strategies, rather than a single strategy.

3.7.2 The Influences of Personal Factors Related to Social Media Use

In line with Bandura's discussion of the application of social cognitive theory in the electronic era (Bandura, 2002), prior research has adopted the social cognitive approach to investigate human behavior in a technological context (e.g., Compeau & Higgins, 1995; LaRose & Eastin, 2004). In this vein, this research extended the social cognitive model of SRL in the context of voluntary use of social media for learning by proposing that personal factors related to social media use can also exert significant influence on people's use of SRL strategies and the results turned out to validate this proposition. In particular, hierarchical regressions indicated that for

each SRL strategy, personal factors related to social media use contributed extra significant explanations. The influence of each factor will be elaborated as below.

First, social media self-efficacy was found to be one of the most influential personal factors related to social media use that can exert influence on the degree to which SRL strategies, involving goal setting, performance control, and self-evaluation, were used. In other words, in a learning environment mediated by social media, a student with higher self-efficacy of using social media is more likely to self-regulate their learning more. This is in line with previous studies which demonstrated that students with higher Internet self-efficacy were more likely to be self-regulated in online course learning (e.g., Kuo et al., 2014; Tsai et al., 2011). One possible explanation is that people with higher social media self-efficacy have more experience of using social media, thus they believe they are more capable of harnessing the useful resources on various social media and activating their SRL strategies to meet their learning needs.

Yet, social media self-efficacy was found to exert no influence on the use of environment structuring strategies, which means that people's behavior of arranging a learning-friendly environment is not related to whether they feel they are efficacious to use social media for learning or not. This may also be due to the incomplete measurement of environment structuring in this study, which only measured learners' efforts to arrange their physical surroundings to reduce distractions and interruption. It is possible that social media self-efficacy may be more influential in affecting people's SRL strategies of structuring online environment instead of the physical environment measured in this study. Thus, as discussed earlier, it is recommended that future studies that concern learning in social media should also include the structuring of social media environment for learning to reduce distractions from social media platforms.

Second, the results indicate that learning outcome expectations for social media can exert influence on the extent of using SRL strategies of environment structuring, performance control, and self-evaluation. This indicates that a learner who expects to gain knowledge and improve their learning by using social media

will be more likely to activate SRL strategies to structure the learning environment, to control learning performance, and to self-evaluate. This finding is consistent with prior information system research by Venkatesh et al. (2003) which suggested that learning outcome expectations for a learning system were the most relevant factors affecting learning technology usage behaviors.

Although people who have a higher level of expectations for gaining learning outcomes in social media were expected to be more active in using SRL strategies, the effect on the use of goal setting strategies was not found. This means that even though individual expect that using social media will help them attain gains in learning performance, they may or may not engage in goal setting strategies. One possible explanation is that when students voluntarily use social media to support formal learning in school, their learning goals in social media are still set according to the course requirement. In this vein, learning outcome expectations for social media may not have any effect on goal setting.

Finally, attitude towards using social media for learning was found to be related to people's use of all four SRL strategies, i.e., goal setting, environment structuring, performance control, and self-evaluation. Similarly, past research in online course learning also found that learners' attitude and preconception towards a web-based learning system could affect their learning behavior and achievements when learning with that system (Cheng & Chau, 2009). While prior research on social media use for learning have found that people who have favorable attitude towards using a social media platform for learning are more likely to engage in continuous learning on that platform (e.g., Hong et al., 2016; Mao, 2014), this study provides further evidence that a student with more favorable attitude towards using social media for learning can also be more active in using SRL strategies to manage their learning in social media.

Taken together, among the personal factors related to learning investigated in this study, self-efficacy can exert influence on the use of environment structuring strategies; intrinsic goal orientation can influence goalsetting and performance control; and task value can have an effect on using performance control strategies.

In addition to the personal factors related to learning in social media, the present study further investigated personal factors related to social media use, including social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning, which were drawn from technology use literature that adopts a social cognitive perspective to explain technology usage behavior. As expected, a hierarchical regression analysis on the data of Study 1 demonstrated that the integration of personal factors related to social media use had significantly contributed more explanatory power to the conceptual model that explains the behavior of using SRL strategies. In particular, the use of self-evaluation strategies could only be influenced by personal factors related to social media use (i.e., social media self-efficacy, learning outcome expectations for social media, attitude), which suggests that the extent to which people self-evaluate their learning in social media is more related to people's motivational belief of using social media for learning. Likewise, when comparing self-efficacy for learning and social media self-efficacy, the personal factor related to social media use (i.e., social media self-efficacy) seems to be more influential on people's engagement in SRL strategies of goal setting, performance control, and self-evaluation.

3.7.3 The Effects on Learning Satisfaction in Social Media

Learning satisfaction reflects the positive evaluation of students on their learning experiences, which is an affective learning outcome (Biner et al., 1997; Liao & Hsieh, 2011). The results suggest that the use of all four SRL strategies significantly predicts learning satisfaction when students voluntarily use social media for formal learning. This is consistent with prior research which indicated the effect of using SRL strategies on students' learning satisfaction with online course learning (e.g., Artino, 2007; Kuo, Walker, Schroder, & Belland, 2014).

In the simultaneous multiple regression analysis, goal setting was found to be the most influential predictor of satisfaction, followed by environment structuring, self-evaluation, and performance control. In particular, the relationship between goal setting and learning satisfaction has already been revealed in prior studies in other learning contexts. For example, Tabuenca et al. (2015) found that learners who set

goals in the mobile learning process were more likely to feel satisfied with their learning when goals were accomplished. This satisfaction could further motivate continuous learning and persistence in front of difficulties. In line with previous research, the results of this study also revealed that people are more satisfied with their learning satisfaction in social media when they employed goal setting strategies.

In addition, this study also found that constructing a learning environment with fewer distractions was a significant antecedent of the satisfactory learning experience in social media. A similar finding was found in Wu (2015), which suggested that when learning in an environment with too many distractions irrelevant to course learning, students would fail to maintain focused attention on learning, which in turn affect their satisfaction with the learning experience.

Moreover, in the process of learning, the more performance control strategies (i.e., task strategies time management, and help seeking) a students use, the more likely the student will perceive the enjoyment of acquiring knowledge and solving problems (Kuo et al., 2014). Further, learning satisfaction may also emerge from the evaluation of what one has achieved. For example, one way of self-evaluation of learning in social media is through comparison with other online learners. The social presence of other peer learners can exert positive influence on learning satisfaction in a distance learning environment (Artino, 2007; Ke, 2010). It is therefore reasonable that using self-evaluation strategies is also important in achieving satisfactory learning experience in social media.

Collectively, the results of this study reveal that the extent to which students use SRL strategies (i.e., goal setting, environment structuring, performance control, and self-evaluation) is positively associated with their learning satisfaction in social media. Previous studies on online course learning have suggested that the more the students are satisfied with their online learning experience, the more they get motivated to engage in continuous online learning, which in turn can lead to better academic achievements (Johnson, Hornik, & Salas, 2008; Lee & Lee, 2008). In this light, it is crucial to understand students' learning satisfaction in social media, which may exert influence on people's overall evaluation of their learning effectiveness

and continuous motivation to voluntarily use social media for learning. Regarding this, the findings of this study provide evidence that using SRL strategies can be a significant predictor of students' learning satisfaction in the context of voluntary use of social media for formal learning in school.

3.8 Summary

The results of Study 1 revealed that three of the six SRL strategies referenced in prior research, namely, task strategies, time management, and help seeking, were loaded together and thus combined as one variable as *performance control*. That is, the principal component analysis suggests that there are four SRL strategies employed by students when voluntarily using social media for formal learning in school, which are goal setting, environment structuring, performance control, and self-evaluation.

In addition, in terms of the influence of personal factors related to learning, Study 1 found that when students voluntarily use social media for course learning in school, self-efficacy for learning was positively associated with the use of SRL strategies of environment structuring; intrinsic goal orientation was positively associated with the use of SRL strategies of goal setting and performance control; and task value was negatively related to using performance control strategies.

Further, with regard to the influence of personal factors related to social media use, social media self-efficacy was found to be positively associated with the use of SRL strategies of goal setting, performance control, and self-evaluation; learning outcome expectations for social media appeared to be an influential factor explaining the people's use of SRL strategies of environment structuring, performance control, and self-evaluation; and attitude toward using social media for learning was positively associated with the use of all four SRL strategies, i.e., goal setting, environment structuring, performance control, and self-evaluation.

Moreover, Study 1 also addressed the effects of using SRL strategies on students' learning satisfaction when using social media for formal learning in school.

The results suggest that the use of all four SRL strategies are positively associated with learning satisfaction in social media.

CHAPTER FOUR STUDY 2

This chapter presents Study 2, which aims to explore the SRL strategies students use to manage their learning with social media and the environmental factors that are critical in the social media learning environment. Accordingly, Study 2 extends the SRL strategies in study 1, and further whether there are other SRL strategies that deal with social media use for learning in the voluntary context, in addition to what has been suggested in prior research. Moreover, to explore the potential environmental factors in a self-constructed learning environment in which students use various social media to support formal learning, the affordances approach provides a useful theoretical perspective to understand the characteristics of the resources in an environment with multiple technologies available (Evans et al., 2017; Rice et al., 2017). Thus, Study 2 explores the social media affordances as environmental factors that students perceive in the learning environment when they voluntarily use social media for formal learning. The development of the research questions, the study method, results of data analysis and discussion of the findings are presented in this chapter.

4.1 Exploring SRL Strategies in the Voluntary Context

To gain desired learning outcomes, it is important that students engage in SRL strategies to manage the autonomy and control in the voluntary context. Using SRL strategies is very important in the learning process as it can affect learning outcomes, such as learning motivation, performance, and satisfaction (Barnard et al., 2010; Pintrich & de Groot, 1990; Zimmerman & Pons, 1986). Study 1 uncovered four SRL strategies, which are goal setting, environment structuring, performance control, and self-evaluation, students used when using social media voluntarily to support formal learning. These strategies were mainly derived from the literature on online learning in mandatory context (e.g., Barnard et al., 2010; Dabbagh & Kitsantas, 2012) and were identified in the voluntary context of using social media for formal learning in Study 1. It is noted that students engage in these SRL strategies in the mandatory context were mainly related to the regulation of their learning within the structured

guidance provided by instructors. In the voluntary context, students have the freedom to decide what to learn in social media and how to adopt and adapt various social media to support formal learning. With less instruction and guidance from instructors, students need to cope with new challenges in social media such as the unguaranteed quality of the learning resources, uncertainty of the availability of learning support, and distractions from online social activities that are not related to learning (Greenhow & Lewin, 2016; Quan-Hasse, 2010; Wu, 2015). Thus, it calls into question whether self-regulated students may also engage in other regulation strategies to manage the tensions when learning with social media in the voluntary context. Hence, the first research question in Study 2 is proposed.

Research Question 1: Do students engage in other SRL strategies, in addition to goal setting, environment structuring, performance control, and self-evaluation, when using social media voluntarily for formal learning and, if so, what are these strategies?

4.2 Exploring Social Media Affordances as the Environmental Factors

Social cognitive theory posits that environmental factors, in addition to personal factors, are also determinants of individuals' behaviors, which could promote or inhibit people's engagement in SRL strategies (Bandura, 1986; Zimmerman, 1989). In the original conceptualization, the environment often takes the form of a structured formal learning setting, where the learning environment, a classroom or an online course system, is pre-determined and controlled by the instructor. When students choose and use multiple social media available to support their formal learning, the learning environment is constructed by students themselves. That is, with all the instruments, materials, and human resources offered by social media, students can construct a learning environment by themselves according to their preferences to meet learning needs. In this vein, environmental influences are exerted through the social media technologies that are voluntarily adopted by students (Dabbagh & Kitsantas, 2012; Kitsantas, 2013; Rice et al., 2017).

To understand the resources and possible actions students perceive when using social media voluntarily for formal learning, the affordances approach is adopted in this study. The term “affordances” was originally used in the field of ecological psychology. As defined by Gibson (1986), affordances can be the action possibilities in relation to the properties of a given environment that animals perceive. With regard to the affordances of social media, it reflects the possible actions that users perceive they could apply social media relative to their needs or purposes (Evans et al., 2017; Rice et al., 2017; Treem & Leonardi, 2012). The affordance approach is of great utility to understand the various ways users adopt, appropriate, and reinvent the material features of various objects to accomplish tasks (Rice et al., 2017). From an affordance perspective, users perceive the possible actions that an object enable them to take, rather than the objective features or properties (Treem & Leonardi, 2012; Walther, 2013).

Social media affordances have been applied in different domains to explain the use of social media and outcomes. For example, organizational researchers have applied the concept of affordances to explain social media use in organizational communication. For organizational knowledge sharing, Majchrzak, Faraj, Kane, and Azad (2013) have theorized that social media provided the following four affordances: metavoicing, triggered attending, network-informed associating, and generative role-taking. Metavoicing refers to the possibility of using social media to react to other online content; triggered attending is the affordance of social media that invokes an individual’s attention to the new content of interest; network-informed association refers to the capability of social media that enable people to see the ties of relationships between users and information; and generative role-taking is the affordance of social media that enable anyone to take on roles for the purpose of facilitating online conversation (Majchrzak et al., 2013). These affordances were argued to affect how employees would engage in collaborative knowledge sharing within and across organizational boundaries. In customer engagement, Cabiddu, Carlo, & Piccoli (2014) investigated social media use for customer service in a tourism domain and identified affordances of persistent engagement, customized engagement, and triggered engagement that could support customer engagement. In

particular, persistent engagement represents the capabilities of social media that make it possible to have persistent communication with customers; customized engagement represents the possibility of personalized interaction with customers; and triggered engagement represents the affordance of social media that make it possible to interact with customers in a customer-initiated event; In organizational social media use, Treem and Leonardi (2012) identified four social media affordances: visibility (i.e., the capability of social media to make user behaviors, knowledge, profiles, and network visible), persistence (i.e., the possibility of social media to make information and communication remains accessible), editability (i.e., the possibility of social media to enable people to craft or revise content before or after a communication), and association (i.e., the possibility to establish relationships between individuals, or between an individual and an information.). It was suggested that these affordances could be related to the socialization, knowledge sharing, and power processes within organizations. Thus, the affordances approach can be useful in understanding various ways users make use of the resources afforded by social media to manage the communication environment (Lee, 2010).

In educational literature, affordances of social media have mainly been examined in the mandatory context. That is, learning and usage of social media are required by a course instructor. For example, Våljataga et al. (2011) examined college students' perceptions of the affordances of four social media tools assigned by the instructor, including blog, wiki, aggregator, and social bookmarks. Their results suggested that affordances such as information filtering, assembling the learning environment, community formation and grouping, and self-tutoring are prominent in the learning process. To develop a pedagogical framework of social media, Dabbagh and Kitsantas (2012) proposed social media affordances of personal information management, social interaction and collaboration, and information aggregation and management that instructors can use to guide students' self-regulated learning. However, different from the mandatory context, student may have different perceptions of the affordances of social media for their learning in the voluntary context. This is because the adoption and usage of social media in the mandatory context is only related to accomplishing the learning tasks assigned by

the instructor, while learning purposes in the voluntary context are student-initiated and student-led (Greenhow & Lewin, 2016). For example, when using a particular or a set of social media is a mandate for a group assignment, the perceived affordances of social media may only be related to the association and interactivity with other classmates. But if students use the same social media in the voluntary context with an intention to clarify a concept or to expand the knowledge base, they may perceive the affordance of searchability and scalability, which enable the possibility to search for learning resources beyond the materials provided by course instructors and to reach out a larger learning network. Moreover, understanding the social media affordances from students' perspectives in the voluntary-use context will in turn provide pedagogical implications for instructors when integrating social media in designing course activities. Therefore, the second research question of Study 2 is proposed.

Research Question 2: What are the social media affordances that students perceive when using social media voluntarily for formal learning?

4.3 Methods

To explore students' use of SRL strategies and the social media affordances in the context of voluntary use of social media for formal learning, focus groups were used to empirically investigate the research questions. A focus group method is chosen in favor of other qualitative research methods (e.g., interview) since the interactions among participants during the focus groups can highlight their various views of how to use various social media to support learning (Morgan, 1998). The interactive dynamic of the focus group allows participants to immediately compare and cross-validate their experiences, which can help surface multiple layers of interpretation of the social media features and multiplicity of learning experiences. Prior to recruitment and data collection, the research procedures have been approved by Nanyang Technological University (NTU)'s Institutional Review Board.

4.3.1 Sampling

Participants were recruited based on a convenience and purposive sampling, which is typically used in qualitative research to find participants who are proficient and well informed with the phenomenon of interest (Etikan et al., 2016). In terms of this study, purposive sampling can facilitate the identification of target participants, who are interested in discussing and knowledgeable about social media use in the formal learning contexts. E-mail invitations and campus advertisements were used to disseminate the recruiting information. Potential participants of this study were screened on the requirement that they must be university students aged 18-years and above and must have the experience of using social media for course study in school. Participants were recruited from students at Nanyang Technological University (NTU) in Singapore.

4.3.2 Data Collection

The six focus groups were conducted following the same procedures. Each session was moderated by an experienced moderator and a research assistant. Informed consents were obtained from all participants at the beginning of each session of focus group discussion.

The group discussion started to ask student participants to think about the courses they took in the past few semesters in NTU and to write down the two courses in which they used social media most frequently. Later, participants shared their experience of using social media tools for their course study and their thinking of the advantages and disadvantages of using social media for course study. Next, the moderator explained to students the classification of mandatory use of social media and voluntary use of social media for formal learning. And participants were invited to share and discuss the strategies they used to manage learning with social media in the voluntary context. Finally, participants were presented with a discussion guide including a list of social media. They were asked to discuss about how the features built in each social media can be used for their course study in the voluntary context. The discussion guide for moderators and participants are attached in the Appendix D and E, respectively.

Social media types and tools listed in the discussion guide include social networking sites (e.g., Facebook, LinkedIn, Academia.edu), blogging sites (e.g., Blogger, WordPress), microblogging sites (e.g., Twitter, Tumblr, Weibo), resource sharing sites (e.g., YouTube, Podcasts, SlideShare), photo sharing sites (e.g., Instagram, Flickr), wikis (e.g., Wikipedia), social bookmarking sites (e.g., Delicious, Pinterest), online community sites (e.g., Reddit, GitHub), social Q&A sites (Quora, Yahoo!Answer), video chatting tools (e.g., Google Talk, Skype), instant messaging tools (e.g., WhatsApp, LINE, WeChat), and web-based (cloud-computing) collaborating tools (e.g., Google Office, Calendar sharing). Participants were also allowed to bring up any other social media tools that they used voluntarily for course study but were not listed in the discussion.

With an open-end focus group discussion guide, as enclosed in Appendix D, the moderator guided the whole discussion and the assistant used probes, when needed, to clarify the questions being asked and encourage every participant to voice their opinions. Probing is a research technique in focus group discussions to gain more understanding of the topics of interest (Given, 2008). To ensure similar points are discussed across groups, a detailed guideline of questions and probing points was provided to the moderator, as shown in the discussion guide. Each focus group session took about 90 to 120 minutes, and participants were paid 20 SGD after the study. All focus group sessions were fully transcribed from the audio files, and the transcripts served as the basis for subsequent analyses.

4.3.3 Data Analysis

Content analysis, which is a technique for analyzing qualitative data, was used to analyze text in the transcripts of focus group discussions. Different from other methods such as grounded theory, ethnography, phenomenology, and historical research, content analysis provides knowledge of the text through systematic coding, in which researchers subjectively interpret the contextual meaning of text data and identify the repetitive themes or codes that can answer the questions under study (Hsieh & Shannon, 2005; Krippendorff, 2004; Morgan, 1993; Priest et al., 2002). Content analysis has been commonly employed to the analysis of focus group

discussions because it has the advantages in interpreting what themes are in the data, as well as the reliability and replicability of the interpretations (Stewart et al., 2007). To ensure the rigor and reliability of the interpretation, it is essential and necessary to establish intercoder reliability and agreement between coders (Neuendorf, 2002).

To be specific, the coding proceeded through two phases, which followed the two approaches informed by Hsieh and Shannon (2005). The first phase of data analysis was conducted with the directed content analysis approach where the researcher reviewed prior research and identified a list of variables as the initial coding scheme. Text was categorized into these predetermined codes based on the interpretation of the coder. Next, the second data analysis phase used the conventional content analysis where new codes may emerge inductively from data during repeated and careful readings of the data. In this process, some codes were combined during this process, whereas others were split into subcategories. Thus, using both deductive and inductive approaches will allow a combination of *a priori* and emergent coding, leading to a comprehensive understanding of the phenomenon under investigation (Campbell et al., 2013).

MAXQDA, a qualitative data analysis software, was used to code and to keep track of all the codes in each phase of coding. The author, who was trained with qualitative research methods, conducted a close and iterative reading on each transcript carefully from beginning to end, highlighting all participants' utterances that appeared to describe the use of social media for course study as well as the SRL strategies in the voluntary context. These highlighted texts were deemed as relevant data for the following two-phase data analysis. The basic unit of analysis was an uninterrupted utterance of a single group member, which was a natural segmentation of the recorded group discussion. This unitization method is the most frequently employed to separate data into units in group communication (Hirokawa, 1988; Krippendorff, 2004).

4.3.3.1 Direct content analysis

The first phase of data analysis was designed to use direct content analysis, which focused on using predetermined codes to characterize the learning strategies they used when voluntarily using social media for formal learning and the types of

social media affordances students perceived. With regard to the self-regulated learning strategies, the initial codes of SRL strategies were derived from Study 1, which are goal setting, environment structuring, performance control, and self-evaluation. These strategies were derived from prior studies of self-regulated learning in classroom learning and online learning contexts and were also identified in social media context in Study 1. The SRL strategies which were included in the initial coding schemes were summarized in Table 4.1.

Table 4.1 Initial Coding Scheme and Definitions of Predetermined Codes of SRL Strategies

SRL Strategy	Definitions
Goal setting	Making decisions on specific objective of learning.
Environment structuring	Using strategies to seek suitable environments that are conducive to learning
Performance control	Using strategies, including task strategies, time management, and help seeking, during the actual learning process to regulate their performance.
Self-evaluation	Assessing learning outcomes according to a standard or a goal.
Other strategies	Strategies students use to manage learning with social media in addition to the four strategies described above.

To create an appropriate coding schemes for identifying social media affordances, 82 terms were identified in prior literature in communication and education literature that referred to, or were named as, a social media affordance. To assess the conceptual validity of these affordances, the conceptual framework of affordances proposed by Evans et al. (2017) was adopted. Specifically, three threshold criteria should be considered when assessing a proposed affordance: 1) a proposed affordance should not be an object or a feature of the object; 2) a proposed affordance should not be an outcome; 3) a proposed affordance should have variability. Through an iterative review on the definitions and descriptions of affordances across different articles, a list of 11 primary distinctive categories of social media affordances, including association, editability, identifiability, immediacy, interactivity, manageability, modality, persistence, scalability,

searchability, and visibility, was attained. These 11 affordances served as predetermined codes in the initial coding scheme, as summarized in Table 4.2.

Table 4.2 Initial Coding Scheme and Definitions of Predetermined Codes of Social Media Affordances

Affordance	Definition
Association	Social media enables users to establish and keep bidirectional connections with other users, or to connect with other users in groups, or to connect with some content (Treem & Leonardi, 2012; Gibbs et al., 2013), also refer to as connectivity or linkage (Fox &McWan, 2017).
Editability	Social media enable users to craft and recraft the content before it is viewed by others (Walther, 1993), or to modify or revise the content that have already been communicated (Rice, 1987).
Identifiability	In social media, communicator's identity can be presented or concealed (Halpern & Gibbs, 2013), also referred to as anonymity (Fox & McWan, 2017).
Immediacy	Social media enable users to get immediate response or update (Gibbs et al., 2013; Lee, 2010), also referred to as "signaling" (Rice et al., 2017), "engagement" (Evans et al., 2017), and "trigger attending" (Majchrzak et al., 2013).
Interactivity	Social media enable users to engage in interaction with other users and content through posting, chatting, commenting, liking, etc. (Evans et al., 2017; Sundar, 2008), also referred to as "metavoicing" (Majchrzak et al., 2013).
Manageability	Social media enable users to organize, control, and categorize users and information, also referred to as "information control" (Fox & Evans, 2017), "information filtering" (Väljataga et al., 2011), "selective sharing" (Gibbs et al., 2013), and "privacy control" (Evans et al., 2017).
Modality	Social media enable users to communicate and present information in multiple media formats, such as textual, graphical, aural, video, etc. (Sundar, 2008; Lee, 2010).
Persistence	Social media enable users to have information and communication archived so that they are still accessible as the original display after the communication or presentation is finished (Treem & Leonardi, 2012), also referred to as archiving (Resnick, 2001), durability (Parks, 2008), recordability (Toma, Hancock, & Ellison, 2008), and reviewability (Clark & Brennan, 1991).
Scalability	Social media enable users to reach users and information out of their own network (boyd, 2007).

Table 4.2(continued) Initial Coding Scheme and Definitions of Predetermined Codes of Social Media Affordances

Searchability	Social media enable users to locate information or other users (boyd, 2007; Rice et al., 2017), also referred to as "navigability" (Sundar, 2008).
Visibility	Social media enable a user to see other users' behaviors, knowledge, preferences, personal profile and network connections. (Treem & Leonardi, 2012).
Other affordances	Possible actions that social media enable users to take in addition to the 11 affordances described above.

In the iterative data coding, every uninterrupted utterance of a group participant in the highlighted text, i.e., a unit of analysis, was reviewed at least four times to ensure the consistency of results (Saldaña, 2009). Every unit was coded into one of the predetermined categories of social media affordances and/or one of the SRL strategies wherever possible. Units that did not fit into an existing code was coded into the category of "other strategies" or "other affordances". After this phase, the initial coding frame would be reassessed and undergo subsequent revisions.

4.3.3.2 Conventional content analysis

The second data analysis phase was using the conventional content analysis, which aimed to capture new occurrences of a phenomenon beyond the limit of the predetermined coding scheme. This phase followed a three-step inductive analysis process.

First, data that could not be coded into one of the codes in phase 1, i.e., data in "other affordances" and "other strategies", were reexamined to describe as new affordances or new strategies. While there was no new affordance emerged, three new strategies were identified from the data, which provided insights on new SRL strategies students used to manage learning with social media in the voluntary context. Notably, while initial codebook covered strategies that regulate the learning, the three newly-emerging strategies were about regulating social media use to support learning, including information evaluation, support exchange, and distraction management.

Next, the researcher examined how different codes are related and combined some codes based on their similarities. During this process, the affordance of identifiability was combined with the affordance of visibility in that the perception of identity was described similarly to the visibility of identification. For example, as one student said, “In LinkedIn, they have something like verified user so somehow they use it to verify, actually, if that person is truly knowledgeable in that domain. So that would actually may more into credibility add more of credibility.” In other words, social media enable people to identify themselves and/or others by making the identity visible to others, such as the identity of being a verified user in this case. So the affordance of visibility and identity were not empirically distinct as presumed.

Last, the researcher examined the data for each SRL strategies and social media affordances and determined whether these SRL strategies and social media affordances can be grouped into a few broad categories.

Regarding SRL strategies, two main meaningful categories of codes were identified depending on the focuses of the strategies of self-regulation. Strategies that are related to managing the learning process, in terms of goal setting, environment structuring, performance control, and self-evaluation, were grouped as regulation of learning. These strategies were also SRL strategies that have been widely discussed in the traditional classroom and online learning settings (Winters et al., 2008). At the same times, a set of new strategies emerged from the context of voluntary use of social media, these strategies were more related to managing the information flow and communication activities in the social media environment, such as information evaluation, support exchange, and distraction management. These strategies were also observed in prior studies about the use of social media for learning (Wu, 2015), health information seeking (Walther et al., 2018), and news sharing (Lee & Ma, 2012). It is possible that because social media are not specifically designed for learning, students need to strategically regulate the social media environment so that it can be more conducive to learning. Taken together, the predetermined strategies from initial coding scheme could be grouped as a category of strategies as “regulation of learning”, while new strategies emerging from the data

were grouped as a cluster of “regulation of social media environment”. The final categories and selected examples are listed in Table 4.3.

Through close reading and iterative coding, two core categories of social media affordances were identified. For social media affordances, the affordances of editability, manageability, modality, persistence, and searchability were related to the category of individualized social media affordances, and the affordances of association, immediacy, interactivity, scalability, and visibility were related to the category of shared social media affordances. The distinct concept of individualized and shared affordances is drawn from Leonardi’s (2013) discussion of technology affordances in organization. An *individualized affordance* is an individual-level construct, which can be enacted by only an individual user when using a technology’s features (Leonardi, 2013). A *shared affordance* is a group-level construct, which can be enacted by two and more actors who converge on similar patterns of social media use (Leonardi, 2013). Applying this concept to the context of this study, the individualized affordances can be social media resources that can be used for personal learning such as personal knowledge organization and management (Väljataga et al., 2011), while the shared affordances can be resources for social learning in terms of collaboration and communication through connecting with other users (Robertson, 2011). The final categories and selected examples are listed in Table 4.4.

Table 4.3 Final Coding Scheme and Selected Examples of SRL Strategies

SRL strategies	Description and selected examples
Regulation of learning	Strategies that are used to manage the learning process.
Goal setting	Remarks indicating awareness of the goal of learning with social media in the voluntary context. <i>Example:</i> <i>"Most of the concepts which they teach in the classes will not be like actually we can understand clearly because since we didn't have the background in the course. I mean we were not able to get the concepts clearly so we used to go to YouTube videos to understand how it is implemented in the real-time industry, how the applications are working? Knowledge that can be gathered from this social media like from YouTube."</i> (A male student participant from Focus Group 6)
Environment structuring	Remarks suggesting behaviors of making the physical environment conducive to learning. <i>Examples:</i> <i>"I would go to the library and study alone. So I would be more focused on my learning."</i> (A male student participant from Focus Group 2)
Performance control	Remarks describing the behaviors to maintain good performance in the learning process, such as time management and effective learning strategies. <i>Examples:</i> <i>"And I do not understand something, maybe take a pause, maybe understand that better and just studying it later."</i> (A female student participant from Focus Group 1)
Self-evaluation	Remarks indicating the review or reflection on what have learned. <i>Examples:</i> <i>"If the notes aren't well enough written... so for example when I write down the bullet points and it's clear at that time, but then I come back to it and it's like "what does this mean?" so at that point I go back to the resource and re-understand it."</i> (A male student participant from Focus Group 5)

Table 4.3(continued) Final Coding Scheme and Selected Examples of SRL Strategies

Regulation of social media environment	Strategies that are used to manage social media usage.
Information evaluation	<p>Remarks describing behaviors of checking the credibility of information in social media.</p> <p><i>Examples:</i></p> <p><i>"And for YouTube, I look at the like and dislike to see how good the video is. If there's a lot of likes then dislikes then it's probably a good video."</i> (A male student participant from Focus Group 1)</p>
Support exchange	<p>Remarks describing seeking and getting support in social media to solve problems related to learning.</p> <p><i>Examples:</i></p> <p><i>"According to me the most time-consuming thing is searching the right video. So I need to ask my friends who have already seen maybe suggest some videos that you've already seen which we feel is good so that it saves my time when I'm very in a hurry yeah."</i> (A female student participant from Focus Group 3)</p>
Distraction management	<p>Remarks describing behaviors of making the social media environment have fewer distractions.</p> <p><i>Examples:</i></p> <p><i>"So there's some extensions which can focus on some particular websites. Suppose I want notifications on my gmail on, or my Youtube on, whereas I want to block the things on WhatsApp and all."</i> (A male student participant from Focus Group 4)</p>

Table 4.4 Final Coding Scheme and Selected Examples of Social Media Affordances

Affordance	Description and selected examples
Individualized Affordances	Affordances that can be enacted by only an individual user when using a technology's features.
Editability	<p>Remarks describing the actions of editing information in social media.</p> <p><i>Examples:</i></p> <p>Stack Exchange Q&A Communities - <i>"And also comments are useful for answers, usually on Stack Exchange is that somebody posts an answer and then there is a few comments, and the answer is edited multiple times to the best."</i> (A male student participant from Focus Group 1)</p>
Manageability	<p>Remarks suggesting actions of using the settings to manage and control the information and users in social media.</p> <p><i>Examples:</i></p> <p>Facebook - <i>"Facebook has somewhere that you have so many friends, you'll have flooding information coming in, so it's like more like a distraction. Unless the notification can automatically categorize what is you want to hear at this moment from what you don't want to hear."</i> (A female student participant from Focus Group 3)</p>
Modality	<p>Remarks indicating the formats of content in social media (e.g., textual, video, audio, visual, etc).</p> <p><i>Examples:</i></p> <p>WeChat - <i>"There's this instant voice message and it's mostly for my friend. She likes to use that rather than texting, because it's so much instant to say out and send it over, rather than text."</i> (A male student participant from Focus Group 6)</p>
Persistence	<p>Remarks indicating actions related to saving and retrieving information.</p> <p><i>Examples:</i></p> <p>WhatsApp - <i>"Even if you mute the group temporally, you can still go back and read the messages in the group discussion."</i> (A female student participant from Focus Group 2)</p>

Table 4.4(continued) Final Coding Scheme and Selected Examples of Social Media Affordances

Searchability	<p>Remarks describing the actions of searching information or users in social media.</p> <p><i>Examples:</i></p> <p>WhatsApp - "Yeah. For example, WhatsApp. When you send answers through and after a while you want to look through the answers you have to scroll, search, try to find it amongst tons of other information. Because we use social media for other communication as well, so you have to sieve out the information manually." (A male student participant from Focus Group 3)</p>
Shared affordances	<p>Affordances that can be enacted by two and more actors who converge on similar patterns of social media use</p>
Association	<p>Remarks indicating the actions of establishing relationships.</p> <p><i>Examples:</i></p> <p>LinkedIn - "And one more platform which I guess no one has mentioned is LinkedIn, like I have a few times I have followed some experts from my field so if I have some difficulties so I directly address them. They have accepted my request so I can directly address." (A male student participant from Focus Group 6)</p>
Immediacy	<p>Remarks indicating notifications or reply that may trigger immediate engagement.</p> <p><i>Examples:</i></p> <p>Google Office - "So Google Office, the good point is that it is really instant, it doesn't lag." (A female student participant from Focus Group 4)</p>
Interactivity	<p>Remarks describing actions of interacting with others.</p> <p><i>Examples:</i></p> <p>Quora – "And then sometimes your answers are not just right or wrong, it can be based on opinions, like different people just have different opinions. So in that matter, it is a nice thing to share your opinions, and then other people can give their feedback about your opinion." (female student participant from Focus Group 1)</p>

Table 4.4(continued) Final Coding Scheme and Selected Examples of Social Media Affordances

Scalability	<p>Remarks indicating the possibilities to extend current social network or knowledge base.</p> <p><i>Examples:</i></p> <p>Podcast - "A lot of researchers, they use podcasts or like to, you know, reach out to people to share their ideas and also podcasts become very important sometimes." (A male student participant from Focus Group 5)</p>
Visibility	<p>Remarks indicating the awareness of users' identity, disclosures, implicit cues, and networks in social media.</p> <p><i>Examples:</i></p> <p>Yahoo Answers - "But sometimes the answers there are three answers. So what I do is something similar. I need to see the 'likes', other people's comments to the reply itself. Whether it's right or wrong. But sometimes, there's no reply or there's no 'likes' so I just make a random choice to see which one is correct." (A female student participant from Focus Group 6)</p>

4.3.3.3 Reliability

To avoid personal bias and ensure the reliability of the coding, another coder was recruited and trained on the final coding scheme created in the MAXQDA software after the two-phase content analysis. One of the six focus group transcripts was randomly selected as a subsample for reliability assessment (Krippendorff, 2004). The second coder reviewed the same units of analysis from the subsample and coded independently. To ensure consistency, the researcher (i.e., the first coder) initially reviewed the codes applied by the second coder. The two coders discussed those text with divergent opinions, and a consensus was reached eventually for those text. This helped the researcher to reach a consensus on the proper interpretation of each code. The second coder then recoded the same group and coded one other randomly-selected group from the six focus groups. At the end of this process, a Cohen's *Kappa*, which has been mostly used to measure reliability in social science

(Zhao, Liu, and Deng, 2013), was calculated to determine the extent of agreement between the author and the second coder. The final Cohen's *Kappa* is .82, indicating very acceptable agreement (Neuendorf, 2002; Popping, 1988).

4.4 Results

4.4.1 Descriptive Analysis

After recruiting through email invitations and campus advertisement and qualification screening, a total of 41 students joined this study and were randomly assigned to six focus group sessions, ranging from 5 to 8 participants each. Among the participants, there were 27 (66%) male and 14 (34%) female students. It was also identified that 20 (49%) participants were undergraduate students and 21 (51%) participants were postgraduate students. In terms of educational background, there were 1 (2%) participant from humanities and arts, 4 (10%) from natural science, 6 (15%) participants from social science, and 30 (73%) from engineering. Most students were engineering students as the participants were recruited from NTU, which has more than 31,000 students and about 42% of the students were from the College of Engineering (Facts & Figures, n.d.). Table 4.1 shows the number of participants and the demographic information in each group.

Table 4.5 Demographic Characteristics of Focus Group Participants ($N = 41$)

Number of participants	Focus Group (FG)						Total	%
	FG1	FG2	FG3	FG4	FG5	FG6		
	7	8	5	6	8	7		
Gender								
Women	1	2	2	4	2	3	14	34%
Men	6	6	3	2	6	4	27	66%
Educational Level								
Postgraduate (Master and PhD)	5	4	3	1	2	6	21	51%
Undergraduate	2	4	2	5	6	1	20	49%
Educational Background								
Humanities and Arts	0	0	0	1	0	0	1	2%
Natural Science	0	1	1	1	1	0	4	10%
Social Science	0	3	0	2	0	1	6	15%
Engineering	7	4	4	2	7	6	30	73%

4.4.2 Focus Groups Analysis

Following the coding process, two main categories of SRL strategies and two main categories of social media affordances were identified from the focus group transcripts. For SRL strategies, four SRL strategies, i.e., goal setting, environment structuring, performance control, and self-evaluation were related to the regulation of learning and hence were classified under the category of regulation of learning. Another three SRL strategies, i.e., information evaluation, support exchange, and distraction management, were related to the regulation of social media and hence were classified under the category of regulation of social media environment. Table 4.6 presents the frequency and percentage of each category and subcategory of SRL strategies, respectively. Participants mentioned relatively more about regulation of social media environment (76%) than regulation of learning (24%). The sub-

category strategy that was mostly mentioned by students in focus group discussion was information evaluation (41%), followed by distraction management (22%) and support exchange (13%).

Table 4.6 Frequency and Percentage of Units within Each Focus Group Attributed to the SRL Strategies and Subcategories ($N = 41$)

Number of participants	FG1		FG2		FG3		FG4		FG5		FG6		Total	%
Regulation of learning	6	20%	9	24%	9	26%	10	27%	9	26%	6	20%	49	24%
Goal setting	3	10%	4	11%	4	11%	5	14%	4	12%	3	10%	23	11%
Environment structuring	1	3%	2	5%	2	6%	1	3%	2	6%	1	3%	9	4%
Performance control	1	3%	1	3%	1	3%	2	5%	1	3%	0	0%	6	3%
Self-evaluation	1	3%	2	5%	2	6%	2	5%	2	6%	2	7%	11	5%
Regulation of social media environment	24	80%	28	76%	26	74%	27	73%	25	74%	24	80%	154	76%
Information evaluation	16	67%	16	57%	13	49%	11	41%	13	52%	15	63%	84	41%
Support exchange	3	12%	5	18%	5	20%	6	22%	4	16%	3	12%	26	13%
Distraction management	5	21%	7	25%	8	31%	10	37%	8	32%	6	25%	44	22%
Total frequency of units	30		37		35		37		34		30		203	100%

For social media affordances, five affordances were grouped into the category of individualized social media affordances, including editability, manageability, modality, persistence, and searchability, and five affordances were grouped into the category of shared social media affordances, including association, immediacy, interactivity, scalability, and visibility. The individualized affordances (42%) were mentioned more than the shared affordances (58%) by students in focus group discussion. The sub-category affordance that was mostly mentioned by students in focus group discussion was visibility (23%), followed by persistence (13%) and interactivity (13%). Table 4.7 presents the frequency and percentage of each category of social media affordances.

Table 4.7 Frequency and Percentage of Units within Each Focus Group Attributed to the Social Media Affordances and Subcategories (N = 41)

Affordances	FG1		FG2		FG3		FG4		FG5		FG6		Total	%
Individualized affordances	41	42%	53	42%	48	42%	54	43%	47	42%	49	41%	292	42%
Editability	4	4%	5	4%	3	3%	2	2%	6	5%	8	7%	28	4%
Manageability	11	11%	13	10%	12	10%	13	10%	12	11%	12	10%	73	10%
Modality	12	12%	13	10%	14	12%	15	12%	12	11%	11	9%	77	11%
Persistence	9	9%	18	14%	14	12%	19	15%	13	12%	16	13%	89	13%
Searchability	5	5%	4	3%	5	4%	5	4%	4	4%	2	2%	25	4%
Shared affordances	57	58%	73	58%	67	58%	73	57%	66	58%	70	59%	406	58%
Association	5	5%	11	9%	8	7%	10	8%	9	8%	12	10%	55	8%
Immediacy	4	4%	9	7%	7	6%	10	8%	6	5%	8	7%	44	6%
Interactivity	12	12%	17	13%	15	13%	18	14%	14	12%	15	13%	91	13%
Scalability	8	8%	10	8%	10	9%	10	8%	9	8%	9	8%	56	8%
Visibility	28	29%	26	21%	27	23%	25	20%	28	25%	26	22%	160	23%
Total frequency of units	98		126		115		127		113		119		698	100%

4.5 Discussion

This section presents a discussion of the results of Study 2, which explores the SRL strategies and social media affordances in the context of voluntary use of social media for formal learning. From the data analysis, two categories of SRL strategies, i.e., regulation of learning and regulation of social media environment, and two categories of social media affordances, i.e., individualized affordances and shared affordances, were identified. The following subsections discuss the results in detail.

4.5.1 *Using SRL Strategies to Manage Learning with Social Media*

From the analysis of the focus group discussion, two main categories of strategies were uncovered: regulation of learning and regulation of social media environment. That is, there were two dimensions of self-regulation: one is about regulating the learning process, and the other one is about regulating the use of social media. In particular, regulation of learning refers to strategies that students take to regulate their learning behaviors in order to achieve active engagement in learning and achieve learning goals. Regulation of social media environment refers to actions that students take to regulate their social media use in order to manage the tensions of learning with social media.

4.5.1.1 Regulation of learning

Regulation of learning is using strategies to manage the learning process, which include setting goals at the beginning of learning, structuring learning environment, controlling performance, and evaluating learning outcomes. These strategies were derived from prior studies of self-regulated learning in the contexts of online learning and classroom learning, and were also identified in the context of using social media for learning.

Goal setting. The analysis suggests that students had clear goals when voluntarily using social media for learning, which mostly stemmed from the lack of clarification from formal teaching. As a female student participant from Focus Group 1 described the goal of solving problems from tutorial, “*I use it to mostly search questions that I don’t understand or I don’t know how to answer from tutorial, or some concepts that I don’t understand. I use it mostly for quantum mechanics and algorithm and computing courses.*” The goal of learning in social

media was also sometimes related to students' eagerness to extend knowledge and dig deeper from what was learnt in formal classes. For example, a male student participant from Focus Group 5 talked about his goal of learning in YouTube was to relate concepts in class to real world application, *"As many of them used YouTube as one common thing, so during my undergraduate, our curriculum was mostly broad based rather than learning one subject. So we took a lot of common courses like some mathematical courses etc, but for the core courses we have like very limited subjects. That is how the curriculum was for the undergraduates. So I am about to take an exam for the masters. So the syllabus there is much wider in terms of subjects and so for my learning, apart from doing my undergraduate, I do watch a lot of YouTube videos where it will quickly help me brush up those topics for exam. As for most of the difficult things that are difficult to visualize for example refining the vertical columns for defining everything into separate parts so how does it work sometimes it can show how different parts can be separated so to visualize those things it helps"*.

Environment structuring. A physical learning environment with fewer distraction is important for learning productivity. To complete a learning task without interruption, students discussed about their effort to find a quiet space to learn with social media. For example, *"NTU has a lot of places, so we can go anywhere for study. I don't think it very difficult to find a secluded a place,"* as a male student participant from Group 1 mentioned. It also seems that when structuring a learning environment, while some students preferred to study separately, they would still connect with peer learners via social media. As a female student participant from Focus Group 3 mentioned, *"It's hard to make everyone meet and discuss, and many of us prefer to study at home when there is no class. But we can still discuss our group assignment through WhatsApp and Skype."*

Performance control. To maintain active engagement in learning towards learning goals, students enacted strategies to regulate their learning performance. In the context of voluntarily using social media for course study, students expressed their feelings of autonomy and engagement in taking control of their learning process. A female student participant from Focus Group 3 mentioned about balancing time spent on learning and social activities, *"Actually for me it's more of time management. So if you set yourself, just for example this time I want*

to study then at that time you just find yourself a place where no one else is there and then just turn off everything, like your Facebook or whatever, and just study. For me it's more of like time management. When it's your social time, of course you have to hangout, I mean like don't multitask, like study and hang out at the same time. It's just your time management." To maintain active engagement in learning, students chose learning materials in social media that were more interesting and easier to comprehend. As a male student participant from Focus Group 3 described, *"I feel that the quality of the video itself also matters. Like for example, if the quality is very bad, you will feel very bored just to finish even like one minute of the video. But if like 'One Minute Physics', it's very interesting and then the content is very good. So even though it's like four minutes, you also will spend time to watch."*

Self-evaluation. To make sure the learning goals were achieved, students evaluated what they had done and whether further study was needed. As a female student participant from Focus Group 5 talked about her strategy of self-evaluation before an exam, *"I think it depends on what time you are using... so you can use Facebook and you can ask your doubts ten days before exam but when the exams approach and you just want to concentrate...so you don't need any more information...you already have all the information. You just need to go through it again or something like that. So that's when you stop any more information coming your way and go through what you already have."* In this case, this student had some new doubts after evaluating her learning, but she chose to review the resources she already had instead of reaching out for more information. One male student participant from Focus Group 5 also mentioned about engaging in self-evaluation of his learning by looking back to notes he took when learning from a video, *"I'm watching a video I write down the notes and later on I can refer to the notes instead of the video itself. So then it also solves the problem of a one hour or two-hour long video I can select the things I want to remember and write them down and later on I can refer from own notebook. Those are my notes so they are credible and reliable."*

4.5.1.2 Regulation of social media environment

While students engaged in the strategies to regulate their learning process, they also strategically use social media to deal with tensions with learning in

social media (e.g., the differentiation of useful information and misinformation), as well as tensions with learning in the voluntary context (e.g., the blurred boundary between learning activities and social activities in social media). In the analysis, three types of strategies related to regulation of social media environment emerged from the focus group discussion: information evaluation, support exchange, and distraction management.

Information evaluation. When learning with social media in the voluntary context, the learning content was not directly provided by the course instructors. Thus, the evaluation of what was credible information to learn relied on students themselves. As a male student participant from Focus Group 1 talked about the need for credible resources, *“But suppose I have a time constraint and I have to finish the course now within just three months, I don’t have really that much of time I have some more work, project and three other courses to do, but then I would be more inclined towards taking the best credible source and finishing off.”* Regarding this, it was found that students evaluated the credibility of information and sources in social media with relevant heuristic cues. For example, as a female student participant from Focus Group 4 said, *“I think user profile is practically helpful because I think for these Q&A sites, credibility will be important to the users. To the people who are seeking answers. So if the person answers you is from that particular profession, or has a lot of experience, or is a very high VIP user or something, then you will take his answer better.”* The other male student participant from Focus Group 1 also mentioned about the use of aggregated user ratings to indicate credibility, *“Suppose I’m very sure about the authenticity about the information, or the person who is giving the information I’m very sure about the authenticity of that person, I will be more inclined to give a like.”*

Support exchange. When coming across problems or looking for related information in a more efficient way, students reported strategies of seeking solutions from classmates or unknown expert users via social media. The support students needed were mainly related to information, i.e., an answer to a problem. As a male student participant from Focus Group 3 students described the use of ResearchGate and Quora to ask questions, *“Other classmates or other experts as well like if we have...well either it can be for your classmates or if you have like... ResearchGate wherein you just put in your doubt and then experts from those fields feed in on Quora... we use Quora to put out peer questions and people*

would reply to them, so you might be having some understanding of the thing but then those views clear it more.” The informational support seeking was also common in peer learning via social media. For example, “*Yeah. Also another function is peer learning. I ask questions or get answers from friends. Sometimes you don’t understand anything, you just send a photo and they will reply you,*” as described by a female student participant from Focus Group 3.

In addition to the exchange of support on solving a learning problem, there were also encouragement and inspiring influences exchange in social media. This might be because social media by nature was more related to social activities. As said by a male student participant from Focus Group 6 about encouragement from peers in WhatsApp, “*Especially when you will do the presentation, other group members just send supporting words.*” In this case, although learning with social media voluntarily was mostly independent, the immediacy and interactivity afforded by social media broke the limitation of time and space for social interaction, thus making students feel less lonely and helpless when facing learning problems (Ahern et al., 2016). The motivational support was also found in the network beyond immediate known networks. For example, a male student participant from Focus Group 1 indicated that he tended to follow some influencers to motivate themselves. “*The bloggers are like who you want to be in the future. Like, for programming, many expert people they just learned by themselves. They share their experience and from their stories you get more motivated.*”

Distraction management. One significant problem students had to deal with was to balance the use of social media for social purposes and learning purposes. For example, the unrelated notifications and recommendations in social media may distract students from learning. As a male student participant from Focus Group 5 student described, “*And just don’t spend time on YouTube because I might end up looking at some other videos. They have the recommendation bar which brings you down to different things that you don’t want to see.*” And accordingly, they strategically use social media to cope with such interruptions, “*So when I was watching the video, I just made it full-screen. So I could be more focused,*” as mentioned by a male student participant from Focus Group 4. One other male student participant from Focus Group 5 also described the strategy to manage social interactions and system recommendations unrelated to learning.

“For me, the advantage is obviously accessibility. A small way in which I try to overcome that distraction, which is the biggest problem for me, is to have a separate account. For Twitter, I have a personal account, and I have a professional account which I follow news or entertainment outlet which is relevant to me. Or for YouTube, I open incognito tab, so all my historical data, which are my interests, are not directed to me so everything is very default, so I can focus on things which are there in the first place. Like I want to focus on math and things like that”.

4.5.2 Social Media Affordances for Learning

In addition to SRL strategies, the social media affordances that students perceive in the voluntary context were also examined. For social media affordances, two categories of SRLs strategies were identified from the focus group discussion. There five individualized social media affordances, including editability, manageability, modality, persistence, and searchability, which are the possible resources embedded in the functions and features of social media that can be enacted by individuals. In addition, there are five shared affordances, including association, immediacy, interactivity, scalability, and visibility. The enactment of these shared affordances requires the involvement of at least two users.

4.5.2.1 Individualized social media affordances

Editability. Editability reflects the extent to which social media enable individuals to craft or recraft a communicative act. This affordance has been found common in the context of online interpersonal communication (Walther, 1993) and organization communication (Rice et al., 2017). This was common in collaborative work, which was a common practice in many course design in formal education. For example, students would spend time and effort discussing the group assignment before they started working on the writing. As a male student participant from Focus Group 3 said, *“I think we have used them for group presentations so...we were in a group of 5 and we had to make a common report, so we all discussed what were the topics we were making, and then we shared this particular Word file on Google Docs or Google Share or something.”* In addition, by offering the opportunity to modify and revise content, editability

allowed for more fidelity and comprehension. As one female student participant from Focus Group 3 describe the editability of YouTube, *“Sometimes the videos are followed by the written notes after that, like the professors themselves have written certain things after that, in order to clarify certain things he spoke about. Those are really helpful.”* In this way, the quality of the generated content could gain some degree of control and revision even after the original display. On the other hand, students also perceived the negative effect of editability affordance. Taking the editability of Wikipedia as an example, *“Yeah we all know that the Wikipedia page can be edited by anyone who’s not even related to the topic,”* as described by a male student participant from Focus Group 5. In this case, the editability might lead to manipulation of content by less-qualified users.

Manageability. The affordance of manageability can be considered as the possibility of organizing, controlling, and categorizing the content and user in social media (Gibbs et al., 2013). This affordance was perceived by students as useful in selective exposure, selective sharing and privacy control. That is, students could use some features in social media to manage the content and people that were related to learning. For example, a male student participant from Focus Group 3 mentioned the control of video playing on YouTube, *“Like for rewinding and fast-forwarding, like when you watch a YouTube video, trying to figure out a concept, this is very helpful as you can skip the parts you understand and go to the parts that you want the answers, or you can just replay. That’s a part I find helpful.”* Students also categorized friends or groups in social media with different priorities, for example, as a male student participant from Focus Group 5 described, *“Just as he pointed out sometime before, the same people will be in two different groups, one will be for an official one, one will be for the just the casual. So we’ll give more priority to the official group because we know what will be posted there, so we prioritize.”*

Modality. The affordance of modality refers to the extent to which social media enable users to communicate and get information in different content formats (Lee, 2010; Sundar, 2008). Social media differed according to their modality, with Wikipedia being predominantly textual and YouTube being visual and audio. One male student participant from Focus Group 1 described about his preference for learning with videos, *“For me, I prefer video lectures by profs because like at least he is comfortable and going through the slides, there are a*

lot of things that prof usually speaks about that are not in the slides or not in the books, the way they explain the things, so that is more important for me so I prefer video lectures.” Another female student participant from Focus Group 4 mentioned about the ability to send both text and voice messages in WeChat, which offered a high level of modality, *“There’s this instant voice message and it’s mostly for my friend. She likes to use that rather than texting, because it’s so much instant to say out and send it over, rather than text.”* She also mentioned voice message was mainly used in urgent situations that an immediate reply was needed. In this case, students were able to increase the modality of communication with social media.

Persistence. The affordance of persistence is the second most commonly discussed in the group discussion (14.2%), slightly less than interactivity. This affordance refers to the extent to which social media users to have information and communication archived so that they are still accessible as the original display after the communication or presentation is finished (Lee et al., 2014; Treem & Leonardi, 2012). The saving could be done automatically by a system. For example, when users logged out from instant messages or Facebook, the conversations and posts remained available to users and did not expire or disappear. As one male student participant from Focus Group 6 described, *“If you are in a study group on WhatsApp you can have a log of messaging coming up about a question. Say while I am travelling on a bus or something like that, I can view the discussion at later point of time.”* That is, the persistence of communications in social media also made it possible for users to learn from others’ discussion, which had been automatically persistent in social media. In addition, some students also purposively used the features of social media to realize the persistence affordance. As a female student participant from Focus Group 2 mentioned, *“Very important like you need it and you can’t forget it and something like that. Then you could always make a WhatsApp group with only you as a member, call it a memo and post it there also.”* In this case, the group features were used creatively to make useful information persistent and retrievable.

Searchability. The affordance of searchability reflects the possibilities in social media that people can actively get information through active searching (Rice et al., 2017). This affordance was mainly offered by the built-in searching

functions. In learning, addressing a puzzle related to coursework was deemed as the goal or outcome. The searchability was particularly important when students face the issue of information overload due to the use of social media. As one male student participant from Focus Group 1 student mentioned about how the searchability afforded by WhatsApp could facilitate information seeking, *“If you’re thinking of something you just need to search. You cannot just go through all the posts about the discussion.”* If the affordance of searchability was not present or low in a social media, it would be hard for students to know what useful learning resources was available and accessible (Treem & Leonardi, 2012). As a female student participant from Focus Group 3 illustrated how the searchability afforded by YouTube made her aware of what she could get, *“I don’t know if there will be some videos can be helpful for me to clarify the concept, but I know I can search and find out. The searching makes me more clear about what I can get.”*

4.5.2.2 Shared social media affordances

Association. The affordance of association refers to the extent to which social media enable users to establish and keep relationships with other users (Treem & Leonardi, 2012). In social media, the social relationships are expressed through following and subscribing to other users or content, or joining a group (Gibbs et al., 2013). For formal learning, students established unidirectional connections with knowledge users as supplementary learning resources. As one female student participant from Focus Group 2 described the use of Pinterest to follow knowledgeable users for her course on art design, *“You can actually follow other people. Because everyone has their own personal library already, and if their library is really good right, it actually saves time if you follow that person and then you get all the information that they source out for themselves.”* When taking a course, it was also common for students from the same class to establish student-led groups for course-related information exchange. As one male student participant from Focus Group 1 talked about class groups in WhatsApp, *“Then there’s WhatsApp obviously because every class has a WhatsApp group and and those groups we discuss about the questions that are being asked in class. Moreover what questions are gonna appear in the examinations, what doubts we*

have regarding the class itself. We share pictures and videos from the tutorials itself.”

Immediacy. The affordance of immediacy refers to the extent to which social media enable users to get immediate response or update (Majchrzak et al., 2013). In learning context, this affordance facilitated the communication by enabling instant feedback from others. As a male student participant from Focus Group 5 said, *“But what I like about social media is that it’s immediate. Whenever we do peer learning, whenever you have a question you probably have immediate response, getting the person’s attention within the shortest span because people always check their social media.”* In this case, although social media was not originally designed for educational purposes, the everyday use of social media for personal life made it natural to facilitate learning communication. In addition, the built-in features, such as updates and notifications, also contributed to the immediate engagement with social media. As a male student participant from Focus Group 3 student said, *“When someone has a problem, he can just post it in Facebook group and everyone will get the notification of the new post.”*

Interactivity. The affordance of interactivity refers to the extent to which social media enable users to engage in interaction with other users (Evans et al., 2017). It seems that the possibility to interact and communicate with other users to supplement the formal classroom teaching was an important reason why students used social media voluntarily for formal learning. As a female student participant from Focus Group 3 expressed how WhatsApp could facilitate the interactions and peer support among students when some students were afraid to seek help from instructors directly, *“Of course because if it’s a trivial question it is useless to ask the professor and just waste some part of the class. Some students might be knowing it already, so they might ask in the group itself someone might be able to come up with the answer and then a lot of time and moreover some mutual discussion will also happen.”* Similarly, another female student participant from Focus Group 5 described how interactivity afforded by WeChat helped disseminate course-related information when the course instructor restricted the access of resources, *“The course is the Financial Statement Analysis, and the platform that we use is WeChat. We use this to take photos and share with groupmates with the case studies. It is because of the teacher in this course. The teacher is very focused on the case and the privacy, so he doesn’t*

want to hand out the material so we won't keep the material. We can only take photos about the answers, so we use this."

Scalability. The affordance of scalability is about the possibility of approaching people or getting useful information which may not be within the current network and knowledge base of a user (boyd, 2007). Many students mentioned that the possibility to connect and interact with a larger network of people was the main difference between institution-based learning technologies and public social media tools. For example, one female student participant from Focus Group 3 shared her experience of learning from the discussion among experts in industry from Facebook groups, when she was taking a new course with no background knowledge and gained more application-oriented knowledge from the experts, *"If there is a group in Facebook then you can go directly to the group, how they are there will be lots of experts in the same field so they will be giving like they will be sharing much information on the same topic."* In addition to the ability to extend social network, the analysis suggests that the open and active social media environment also made it easier for students to get useful resources as supplements to their current knowledge base. This scalability of knowledge was offered by other users or the system recommendation. As one male student participant from Focus Group 3 mentioned about the accessibility of learning resources in YouTube that were from prestigious educational institutions, *"Right. In quantum mechanics, there's this entanglement and stuff. When I read in a book I don't really understand. So I have to go to YouTube and look for online lectures or lectures from other schools like MIT."*

Visibility. Visibility refers to the extent to which social media enable users to see others' online behaviors and information (Treem & Leonardi, 2012). The affordance of visibility was consistently the most frequently mentioned affordance by all six focus groups, with around 22% of all discussion related to social media affordances. Scholars have noted that social media distinguish from other information and communications technologies in terms of providing increased possibility to make both behaviors and information visible (Rice et al., 2017; Treem & Leonardi, 2012). In social media like Facebook and LinkedIn, people are more likely to self-present their identity information such as their real names, educational and professional information, and their places of living. Students could identify a user easily from such self-presented information. As

one male student participant from Focus Group 1 student mentioned the visibility of authentic identification, *“If there’s a random medical article and if like is somebody else commented if some random friend commented I wouldn’t take it so seriously. But If somebody who’s practicing medicine in my friend group they commented, ok there is a certain credibility associated with it.”* On the other hand, some students noticed the visibility afforded by social media tended to decrease the degree of identity visibility by concealing their personal information. For instance, a female student participant from Focus Group 3 student described her use of anonymity to avoid negative judgement from others, *“When you want to ask questions. We don’t want to look stupid, you know. We don’t know it’s considered stupid questions, but some people might think, ‘This person is very stupid. Very easy question also wants to ask’. Anonymity is very important.”* In addition, with the communication visibility afforded by social media, students were also able to learn from other users’ communication at any time they want to, without the requirement of immediate engagement especially when they want to focus on other learning activities in social media. As a female student participant from Focus Group 5 described learning from other people’s comments under a YouTube video, *“And most of the time even in YouTube suppose I do not know a lot of people do that, but suppose if you don’t understand the content of the video, suppose you get to the comments parts of the video, you can find a few other people who are also finding the same points, same time.”* Moreover, some non-text communication behaviors, such as liking and following, were also visible in social media. As a male student participant from Focus Group 3 student described about the visibility of number of views and likes in social media, which were aggregated user communication behaviors, *“For everything that is posted out in social media, any form you can easily see the number of reviews or the number of likes, subscriptions or viewers after that. So that itself is a form of verification whether that source is correct.”*

4.6 Summary

This exploratory study has uncovered students’ use of two categories of SRL strategies and two categories of social media affordances enabled by diverse social media technologies when students voluntarily use them for formal learning.

For SRL strategies, the focus group discussions suggest that in addition to the four strategies examined in Study 1, i.e., goal setting, environment structuring, performance control, and self-evaluation, three other strategies, i.e., information evaluation, support exchange, and distraction, management, were also used by the students to manage their learning with social media in the voluntary context.

For social media affordances, Study 2 uncovered two categories of affordances: individualized affordances and shared affordances. Five affordances, including editability, manageability, modality, persistence, and searchability, were grouped into the category of individualized social media affordances. The other five affordances were grouped into the category of shared social media affordances, including association, immediacy, interactivity, scalability, and visibility. Taken together, the identified affordances encompass the major resources offered by social media for learning in the voluntary context, and provide insights into evaluating the influences of a learning environment constructed by multiple social media.

CHAPTER FIVE STUDY 3

In this chapter, Study 3 is presented. The aim of Study 3 is to build on the findings in Study 1 and Study 2 by proposing and testing an integrated conceptual model. Drawing from the social cognitive theory, supplemented by the affordances approach, this model intends to explicate the relationships among personal factors, environmental factors, the use of SRL strategies, and learning satisfaction in the context of voluntary use of social media for formal learning. The development of the research questions, the study method, results of data analysis and discussion of the findings are presented in this chapter.

5.1 An Integrated Conceptual Model

From the social cognitive perspective, the extent to which students use SRL strategies may vary, depending on personal factors and environmental factors (Pintrich, 2000; Zimmerman, 2000). Personal factors take the form of people's inner motivational beliefs; environmental factors are events in an environment that people observe and make sense of (Bandura, 2001b). Personal factors in this study refer to the motivational beliefs a student have of learning and social media use, while environmental factors refer to the affordances of social media that students perceive in a social media learning environment. In Study 1, the influences of two categories of personal factors, namely, personal factors related to learning and personal factors related to social media use, on using SRL strategies have been examined and confirmed. The effects of using SRL strategies on learning satisfaction in the voluntary context have also been identified.

In Study 2, other possible SRL strategies and social media affordances as the environmental factors were further explored. The findings suggest that in addition to the four strategies examined in Study 1, i.e., goal setting, environment structuring, performance control, and self-evaluation, three other strategies, i.e., information evaluation, support exchange, and distraction management, were also used by the students to manage their learning with social media in the voluntary context. In particular, the former four strategies focus mainly on the regulation of learning, including setting a goal of learning, seeking a suitable

environment that is conducive to learning, adjusting and controlling the learning performance, and evaluating learning outcomes. The latter three strategies are more related to the regulation of social media environment, including evaluating information in social media, seeking and offering support in social media, and managing the distractions of social activities in social media. Put differently, results indicate that there are two categories of strategies and students self-regulate their learning through both regulation of learning and regulation of social media environment our context. Findings from Study 2 revealed that both categories of strategies were deemed by participants as important to manage learning with social media and achieve desired learning outcomes in the voluntary context.

Prior research suggests that personal factors can influence not only online learning behavior but also technology use behavior (e.g., Tsai & Tsai, 2003). Here, Study 3 proposes that personal factors identified in Study 1 can exert influence on both regulation of learning and regulation of social media environment. As research has suggested that self-regulated learning is positively associated with more learning satisfaction (e.g., Puzziferro, 2008), it is also possible that integrating strategies from these two categories of SRL strategies can lead to higher levels of learning satisfaction from the use of social media. This is investigated in Study 3.

Drawing on the affordances approach, Study 2 found prominent social media affordances that were perceived by students when learning with social media. These social media affordances were the resources afforded in the social media learning environment constructed by students in the voluntary use context. In particular, there were two categories of affordances uncovered in Study 2: individualized affordances and shared affordances (Leonardi, 2013). Individualized affordances are about possible actions that involve only one user to enact when using social media (Leonardi, 2013), including editability, manageability, modality, persistence, and searchability; shared affordances refer to actions that involve at least two users to enact (Leonardi, 2013), including association, scalability, immediacy, interactivity, visibility. As social media affordances were found to be related to the use of SRL strategies in the mandatory context (Dabbagh & Kitsantas, 2011), it is plausible that student's perception of

the social media affordances can influence how they learn with social media. Thus, Study 3 investigated the influences of these social media affordances as potential environmental factors.

Taken together, Study 3 examines the influences of two categories of personal factors (i.e., personal factors related to learning and personal factors related to social media use), and two categories of environmental factors (i.e., individualized social media affordances and shared social media affordances). These factors are examined about their influences on using two categories of SRL strategies (i.e., regulation of learning and regulation of social media environment), as well as the effects of using SRL strategies on learning satisfaction with social media. The integrated model is illustrated in Figure 5.1. The constructs of the model and their relationships are elaborated in the following sections.

Figure 5.1 The integrated conceptual model

5.1.1 The Influences of Personal Factors Related to Learning on Using SRL Strategies

Personal factors related to learning from the social cognitive perspective are about students' motivational beliefs of a particular learning task. The motivational beliefs examined in this study are students' self-efficacy for learning and their intrinsic goal orientation, and task value.

Self-efficacy for learning is defined as the self-perception of a student's capabilities to master a course or a learning task (Kim et al., 2015). Study 1 has revealed that students who have higher self-efficacy for learning are more likely to engage in environment structuring. According to social cognitive theory, one source of people's self-efficacy was their prior experience (Bandura, 2001a). It is thus possible self-efficacious students are more experienced in finding a learner-friendly environment that is constructive to their learning.

The intrinsic goal orientation refers to a student's motivation for learning as mastering the learning subject. Study 1 found that intrinsic goal orientation was related to the engagement in the regulation of learning in terms of goal setting and performance control. As suggested by the theory of goal orientation (Pintrich, 2000), students who have higher intrinsic goal orientations tend to be more motivated to set progressive goals for their learning, so as to make progress toward their goal of mastery. Intrinsic goal orientation guides the degree of effort and persistence that students would invest in completing the task. In this light, when students voluntarily use social media for a course in school, those with higher intrinsic goal orientation will be more likely to regulate their learning to maintain a good performance during the learning process.

Task value reflects a student's perception of how important, useful, and interesting a learning task is (Cho & Heron, 2015; Pintrich et al., 1990). The way people value the learning task can influence their learning behavior and academic performance (Lawanto et al., 2014). That is, high task value beliefs activate the students to spare more effort and time on doing the task and use strategies to achieve a better outcome. Research has suggested that students are less likely to spend effort to accomplish learning tasks effectively if they do not value the learning tasks (Zumbrunn, 2011). Thus, in a voluntary context where learning

activities are student-initiated, the value a student put on a learning task can also exert influence on the student's engagement in learning. However, in Study 1, task value was found to have significant negative influences on the use of SRL strategies of performance control, which are strategies students use to regulate their performance during the learning process. It is possible that students with higher task value of a learning task may use combined strategies to regulate their learning instead of using a single strategy such as performance control. Based on the arguments presented above, Study 3 proposes the first hypothesis:

Hypothesis 1: Personal factors related to learning, including a) self-efficacy for learning, b) intrinsic goal orientation, and c) task value, are positively associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

Studies into online learning have suggested that individual differences in motivational beliefs, such as self-efficacy, intrinsic goal orientation, and task value, can explain individual differences in online learning behaviors. For example, Moos and Azevedo (2009) found that students who had higher levels of self-efficacy tended to manage the online learning environment in more purposeful manners. In particular, students with higher self-efficacy for learning tended to connect relevant content in a nonlinear way to facilitate learning. Some studies (e.g., Schunk & Ertmer, 1999) also found that students with a goal of mastering the course content and gave higher value to the course were also more likely to engage in social interaction in online learning. The social interaction was about not only requesting feedback but also offering support to others' learning. Students with higher motivational beliefs can effectively manage their learning and persist in a challenging learning context (Pintrich, 2000; Zimmerman, 2011). In the voluntary context of using social media for formal learning, students have full control of their learning and social media use. As social media are not designed specifically for learning, students need to cope with more learning challenges such as the uncertainty of the credibility of information resources, less immediate feedback from the instructor, and distractions from social activities that are not related to learning (Wu, 2015). Applying the findings from research above to the context of voluntary use of social media for formal

learning, this study proposes that students with higher motivational beliefs of what they learn in social media, in terms of self-efficacy for learning, intrinsic goal orientation, and task value, are more likely to engage in regulation of social media environment to help them persist in a challenging learning environment. Hence, this study advances the following hypothesis.

Hypothesis 2: Personal factors related to learning, including a) self-efficacy for learning, b) intrinsic goal orientation, and c) task value, are positively associated with the extent to which students engage in regulation of social media environment when voluntarily using social media for formal learning.

5.1.2 The Influences of Personal Factors Related Social Media Use on Using SRL Strategies

Considering two aspects of the dynamic social media learning context, i.e., technology use and learning, personal factors related to social media use are also considered as the potential influential factors on students' use of SRL strategies when learning with social media in the voluntary context, in addition to personal factors related to learning. As examined in Study 1, the personal factors related to social media use include social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning. These personal factors consider students' motivational beliefs of the technological aspect of learning with social media.

Social media self-efficacy is based upon a student's perception of the level of his or her social media skills, as well as the confidence in learning with social media (Tsai et al., 2011). In Study 1, social media self-efficacy was found to be one of the most influential personal factors related to social media use that can exert influence on the degree to which students engage in regulation of learning, involving goal setting, performance control, and self-evaluation. This is in line with previous studies which demonstrated that students with higher Internet self-efficacy were more likely to be self-regulated in online course learning (e.g., Kuo et al., 2014; Tsai et al., 2011).

Learning outcome expectations refer to a student's belief that using social media will help them to attain gains in learning. In Study 1, the results indicate

that learning outcome expectations for social media can exert influence on the regulation of learning in terms of environment structuring, performance control, and self-evaluation. This indicates that a learner who expects desirable learning outcomes of using social media will be more likely to activate SRL strategies to structure the learning environment, to control learning performance, and to self-evaluate.

Attitude towards using social media for learning refers to an individual's evaluation of using social media as learning tools (Lawanto et al., 2014). A premise in social cognitive theory is that people's behavior is a reflection of their attitude (Bandura, 1986; Schunk, 2005). In Study 1, attitude towards using social media for learning was found to be related to people's engagement in all strategies of regulation of learning, i.e., goal setting, environment structuring, performance control, and self-evaluation. Prior research also suggested that learners' attitude and preconception towards an online learning system could affect their learning behavior and achievements (Cheng & Chau, 2009). Thus, this study contends that when people have a higher level of motivational beliefs of using social media for learning, they may be more likely to engage in regulation of learning. Therefore, the following hypothesis is posited.

Hypothesis 3: Personal factors related to social media use, including a) social media self-efficacy, b) learning outcome expectation, and c) attitude, are positively associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

In a social media learning environment, learning resources distribution and social interactions relied on information technologies to occur. Accordingly, individuals' beliefs in the use of social media, in terms of social media self-efficacy, learning outcome expectations, and attitude towards using social media for learning, are required for students to be successful in managing the challenges in a social media environment, such as the uncertainty of the credibility of information, the availability of peer support, and the distractions from social activities that are not related to learning. Research on social media information evaluation has found that users with higher social media self-efficacy tended to

have more experience of information seeking and social interaction in social media, and were therefore likely to engage more in credibility assessment than users with social media efficacy (Hocevar et al., 2014). In online knowledge sharing research (Chiu et al., 2006), it is also found that the outcome expectations of getting knowledge have a significant influence on online knowledge sharing behavior. Similarly, it is also possible that students' learning outcome expectations can influence their use of social media to not only seek support related to learning, but also offer support to other social media users, which in turn strengthen their own understanding of the knowledge. Moreover, prior research on technology use has revealed that positive attitude towards computer, Internet, or social media influence people's intention to use these technologies (Compeau et al., 1999; Khang, Han & Ki, 2014; LaRose & Eastin, 2004). Research also found that when students have positive attitude towards online learning activities, they would be more likely to engage in active use of the online learning system (Balakrishnan & Gan, 2016). Thus, with multiple social media available for learning, it is expected that students with higher social media efficacy, higher learning outcome expectations for social media, and more positive attitude towards using social media for learning, will be more likely to engage in regulating the social media environment. Accordingly, the following research question is proposed.

Hypothesis 4: Personal factors related to social media use, including a) social media self-efficacy, b) learning outcome expectations, and c) attitude, are positively associated with the extent to which students engage in regulation of social media environment when voluntarily using social media for formal learning when voluntarily using social media for formal learning.

5.1.3 The Influences of Individualized Social Media Affordances on Using SRL Strategies

An individualized affordance is an affordance that can be perceived and enacted by only one individual user when using a technology's features (Leonardi, 2013). Individual affordances uncovered in Study 2 include editability, persistence, searchability, manageability, and modality. These affordances of

social media have been suggested as important for students to construct a personalized online learning environment (Dabbagh & Kitsantas, 2012).

Research online learning has suggested that the individualized affordances in learning management systems could engage students in regulation of learning. For example, Kitsantas (2013) discussed the use of online course calendar and scheduling tools to help students set learning plans related to the course objectives and requirements at the beginning of a course. The editability, persistence, and manageability afforded by these tools could help students monitor upcoming deadlines and set goals to accomplish the learning goals. Dabbagh and Kitsantas (2012) suggested that the modality affordances of social media could enable students to set up a personal archive with learning resources related to course learning in various formats (e.g., text, image, and video); the persistence and searchability afforded by social media further make these archived content retrievable, which were particularly helpful for performance control and self-evaluation. While these studies are mainly about mandatory use and pedagogical suggestions for instructors, it can be implied from these studies that if students are aware of these individual affordances in the voluntary context, they may take use of these affordances for the regulation of learning. Therefore, this study proposes the following hypothesis.

Hypothesis 5: Individualized social media affordances, including a) editability, b) manageability, c) modality, d) persistence, and e) searchability, are positively associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

Prior research also has provided empirical evidence of how the individualized social media affordances enabled by social media may affect the way people strategically manage the social media environment. For example, research in credibility evaluation also suggests that online users engaged in a variety of uncertainty reduction strategies, such as using search engines to seeking out archival information in various social media (Metzger et al., 2010). Additionally, the editability and modality of social media are particularly useful for people to have more control over their communication behaviors (Gibbs et al., 2013). The editability of social media enables individuals to strategically craft

and recraft messages, which may improve message fidelity. Research has also observed that the modalities afforded by social media (i.e., textual and audio) were used for purposes such as to increase message clarity or visibility (Lee, 2010). According, these affordances may influence how students evaluate information as learning resources in social media. Kind and Evans (2015) also found that because the content in wikis was easy to publish and access, organization members would likely use social media to contribute knowledge. In relating these findings to voluntary use of social media to support learning, this study deems that these individualized social media affordances may also promote students' active engagement in informational and motivational support exchange in social media.

Further, due to the large amount of information and limited time to engage in every conversation, Gibbs et al. (2013) found that the persistence and manageability of social media enabled organizational members to manage the distractions and get temporary disengagement. This may also happen in the voluntary learning contexts, when students want to keep focused on certain learning tasks and get temporarily escape from the ongoing flow of information update. Even if students miss out some discussions that are important for the learning tasks, students can still retrieve the conversations later due to the individualized affordances social media, such as persistence, searchability, and manageability. Here, the following hypothesis is proposed.

Hypothesis 6: Individualized social media affordances, including a) editability, b) manageability, c) modality, d) persistence, and e) searchability, are positively associated with the extent to which students engage in regulation of social media environment when voluntarily using social media for formal learning.

5.1.4 The Influences of Shared Social Media Affordances on Using SRL Strategies

A shared affordance is an affordance of social media that is perceived by two and more actors who converge on similar patterns of social media use (Leonardi, 2013). If an individual enacts a shared affordance, he or she can easily

coordinate with other users in social media and achieve personal and shared goals. In the learning context, when a student enacted a shared affordance of social media, interaction and coordination with others could help facilitate learning (Treem & Leonardi, 2012). The shared social media affordances uncovered in Study 2 include association, immediacy, interactivity, scalability, and visibility.

Research in organizational communication suggests that shared affordances of social media can enhance open communication by providing access to a larger network of people and expertise, making expertise and relevant content visible (Majchrzak et al., 2012). Applying to the learning context, the shared social media affordances may promote students to engage in interactive and collaborative learning in social media (Leonardi, 2013). For example, many studies related to social media learning (e.g., Hong et al., 2016; Tess, 2013) have suggested that the direct and group association affordance of many social media could facilitate students' engagement in an online learning community. The social learning activities in online learning community can in turn engage students in regulation of learning in terms of goal setting, performance control and self-evaluation. These online social learning possibilities also enable students to structure a physical learning environment without feeling isolated and alone. Research on organizational communication (Treem & Leonardi, 2012) suggested that the immediacy, interactivity, and visibility afforded by social media (e.g., WhatsApp) enabled organizational members to engage in collaborative working in a more visible and interactive way, which could not be achieved by using traditional communication technologies such as email. In this light, these shared affordances can be important resources for students to regulate their learning as they can get the immediate, interactive, and visible feedback related to their learning. The scalability afforded by social media, which refers to the possibility of large-scale knowledge sharing and social networking, can also enable students to set learning goals beyond classroom learning, choosing a learning environment regardless of space, enacting active learning and self-evaluation. Collectively, the following hypothesis can be proposed.

Hypothesis 7: Shared social media affordances, including a) association, b) immediacy, c) interactivity, d) scalability, and e) visibility, are positively

associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

While the shared social media affordances promote open and interactive communication for learning, these affordances may also increase students' contact with information and activities unrelated to learning. In this vein, students are likely to strategically use particular social media tools and features to manage such tensions. For example, by making feedback and user identity visible, social media make it easier to identify experts and motivate support exchange among users (Evans et al., 2018). In addition, the immediacy and interactivity afforded by social media make it impossible for users to stay disconnected with others. Research in organizational communication found that employees would manage the distraction in social media by going invisible (Gibbs et al., 2013). That is, through a way of signaling one's unavailability, people could selectively respond only when they chose to. Similarly, students may also engage in such strategies to manage distraction when they are more aware of the shared affordances. Taken together, the awareness of shared social media affordances can influence students' engagement in regulation of social media environment. Here, the following hypothesis can be proposed.

Hypothesis 8: Shared social media affordances, including a) association, b) immediacy, c) interactivity, d) scalability, and e) visibility, are positively associated with the extent to which students engage in regulation of social media environment when voluntarily using social media for formal learning.

5.1.5 The Effects of Using SRL Strategies on Learning Satisfaction

Due to the reciprocal interaction posited in the social cognitive theory, people's perceptions, in terms of learning satisfaction, can also be affected by learning behaviors such as the use of SRL strategies. Informed by Hong et al. (2016), learning satisfaction can be defined as the perception of being able to achieve success and positive affective outcome that results from an evaluation of a learning experience. When students take an online course learning program, their satisfaction indicates the success of the program design (Kuo et al., 2014).

Learning satisfaction is also a critical indicator to evaluate whether using certain technologies is effective for learning (Piccoli, Ahmad, & Ives, 2001).

The results of Study 1 found that the use of all four SRL strategies, i.e., regulation of learning, significantly predicted learning satisfaction when students voluntarily use social media for formal learning. Prior research on online learning also indicated the effect of using SRL strategies on students' learning satisfaction with an online course (e.g., Artino, 2007; Kuo, Walker, Schroder, & Belland, 2014). It is thus expected that the extent of students' regulation of learning is related to their learning satisfaction with social media in the voluntary context. Here, the following hypothesis can be proposed.

Hypothesis 9: The extent to which students engage in regulation of learning is positively associated with their learning satisfaction when voluntarily using social media for formal learning.

When using social media voluntarily for formal learning, individuals spend valuable time and effort with the goals of improving skills and acquiring knowledge. In this vein, a social media learning environment that can foster effective learning is critical to students learning satisfaction with social media. Research on distance learning reported that the main reason that students dropped out of an online course was a poorly designed course (Johnson et al., 2008). As the learning resources are sought and organized by students themselves in the voluntary context, students need to evaluate the credibility and quality of the content themselves. Thus, the strategy of information evaluation is important to students' satisfaction with their learning in social media.

In addition, the support exchanged through social interactions can also exert positive influence on students' experience in online learning contexts. Folger & Cropanzano (1998) revealed that the extent to which learners were treated by the instructor with concern and respect during online interactions could influence how they perceive the fairness of the learning and the development of satisfaction with an online course. Some studies also suggest that less support exchange between students, as well as between students and instructors, was the main reason of students' dissatisfaction with online learning (e.g., Ahern et al., 2016). As social interaction in social media is mainly between social media users,

the support exchange may affect how a student feels about the fairness of learning in social media and learning satisfaction.

Further, students may get dissatisfied with learning with social media due to a lack of regulation of distraction. This can be problematic, especially “when users notice too many relevant topics to explore in parallel or too many interesting things that distract attention away from the main task” (Foss 1989, p. 4). Research (e.g., Azevedo, 2005) showed empirically that distraction impaired learning and problem-solving performance. In light of this, it is important for students to manage the distraction well in social media environment, which may influence the attainment of desirable learning outcomes such as learning satisfaction. Therefore, the following hypothesis regarding the effect of regulation of social media environment on learning satisfaction is proposed.

Hypothesis 10: The extent to which students engage in regulation of social media environment is positively associated with their learning satisfaction when voluntarily using social media for formal learning.

5.2 Method

Study 3 aims to develop and test an integrated model of using SRL strategies when students voluntarily use social media for formal learning, based on findings from Study 1 and Study 2. This conceptual model relates personal factors, environmental factors, using SRL strategies, and learning satisfaction with social media in the voluntary context. Specifically, it is proposed that two categories of personal factors and two categories of social media affordances will influence the extent to which students will engage in two categories of SRL strategies, which will in turn predict their learning satisfaction with social media. To test the hypotheses in the model, Study 3 adopted a survey approach to collect the data. This chapter elaborates the method of Study 3, including the sampling method, survey design, data collection, and questionnaire development.

5.2.1 Sampling

Similar to the survey conducted in Study 1, Study 3 also employed the convenience sampling to recruit participants who are university students in

Singapore who were aged 21-years and above and have the experience of voluntarily using social media for course study. With convenience sampling, participants were recruited from university students in Singapore, who could be undergraduate, graduate, full-time, part-time, exchange, undergraduate, master, and doctoral students. Prior studies suggest that students from higher education can make up an important demographic of self-directed online learners (Hood et al., 2015) and social media users (Khang et al., 2014). Thus, a sample consisting of university students suited the current study as the target respondents were students who have experience of using social media for course study in university, which is a typical formal learning context.

5.2.2 Measures

Similar to Study 1, Study 3 also employed a cross-sectional survey design. A self-administered questionnaire was developed to measure students' voluntary use of social media for formal learning and assess the constructs of interest in this study. The questionnaire aims to investigate university students' use of social media for formal learning in the voluntary context and assess the constructs in the conceptual model of self-regulated learning.

The questionnaire starts by asking students about the frequency of general use of social media. Based on the social media tools that were examined in the survey of Study 1 and mentioned by participants in the focus group discussions of Study 2, the categories and examples of social media covered in the questionnaire include: social network sites (e.g., Facebook, LinkedIn, Academia. Edu, ...), blogging (e.g., Blogger, WordPress, ...), microblogging (e.g., Twitter, Tumblr, Weibo, ...), resource sharing sites (e.g., YouTube, Podcasts, SlideShare, ...), photo sharing sites (e.g., Instagram, Flickr, ...), wikis (e.g., Wikipedia, ...), social bookmarking sites (e.g., Delicious, Pinterest ...), online community sites (e.g., Reddit, GitHub, ...), social Q&A Sites (e.g., Quora, Yahoo!Answer, ...), video chatting tools (e.g., Skype, Google Talk, ...), instant messaging tools (e.g., WhatsApp, LINE, QQ, ...), and web-based/cloud-computing collaborating tools (e.g., Google Office, Calendar Sharing, ...). Next, respondents were asked to indicate a course in which they voluntarily used social media most frequently to support their study and to answer about how frequent they use various social media for that particular course, using a six-point scale

with anchors ranging from 0 (= “Never”) to 5 (= “Very frequently (more than 5 times a day)”).

The main part of the questionnaire was designed to measure the constructs included in the conceptual model, which are two categories of personal factors (i.e., personal factors related to learning and personal factors related to social media use), two categories of social media affordances (i.e., individualized affordances and shared affordances), the use of two categories of SRL strategies (i.e., regulation of learning and regulation of social media), and learning satisfaction with social media. Participants answered the questions measuring these constructs based on the course they indicated and social media they used for that course.

For constructs that have existing measurement questions, it is recommended to reuse these questions to improve content validity (Xu & Chen, 2009). In this vein, the measurement of personal factors, regulation of learning, and learning satisfaction, which are constructs that were already examined and verified in Study 1. For the new constructs uncovered in Study 2, namely, the environmental factors and regulation of social media environment, new items were developed, drawing from the focus group discussions in Study 2. When developing measurement for each affordance and social media regulation strategies, multiple items were used to reflect the different aspects of the construct. This is because prior research suggests that multiple items can help attain a more accurate measure of a construct (Xu & Chen, 2009). Therefore, at least four items were developed to each affordance and strategies, which will be evaluated in the factor analysis after data collection. All items were reworded to be consistent, with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The validity and reliability of the questionnaire items were also evaluated empirically. Informed by prior works (Rice et al., 2017; Xu & Chen, 2009), exploratory factor analysis (EFA) was conducted to identify the most representative items that reflect a set of underlying constructs, testing the convergent and discriminant validity of these construct-item correspondences.

When conducting EFA, principal component analysis with Promax rotation was used to extract the constructs and the items that loaded on each construct. Promax rotation was adopted because it assumes that the factors are correlated

(oblique), which is generally assumed in social and behavioral science (Keith, 2015). The Promax rotation was used because the six personal factors, ten social media affordances, and eight SRL strategies were interrelated within the underlying concepts of personal factors, social media affordances, and SRL strategies, respectively. Informed by the recommended procedures in Hair, Anderson, Tatham, and Black (1995), components with the eigenvalue greater than 1.0 were retained as the major principal components. To satisfy convergent validity, the item-construct loading should be greater than 0.5. To satisfy discriminant validity, the discrepancies between cross-loadings should be less than 0.15 (Shen et al., 2013). If the items are good representatives for a construct, they should converge as a principal component. If an item fails to satisfy the validity requirements, it will be removed from the scales. In addition, to verify the reliability of construct measurement, Cronbach's alpha (α) was examined.

5.2.2.1 Measurement of personal factors

Personal factors in this study refer to the motivational beliefs of a student towards learning and social media use. Personal factors related to learning include self-efficacy for learning, intrinsic goal orientation, and task value; personal factors related to social media use include social media self-efficacy, learning outcome expectations for social media, and attitude towards using social media for learning. There were 23 items used to measure personal factors. Higher scores in these items indicate greater motivational beliefs towards learning and social media. Table 5.1 presents the list of questionnaire items measuring these personal factors related to learning and personal factors related to social media use.

Table 5.1 List of Items Measuring Personal Factors

Construct	Questionnaire items		References
	When I was voluntarily using social media tool(s) for the course I indicated,		
<i>Personal factors related to learning</i>			
Self-efficacy for learning (SE)	SE1	I was confident I could do an outstanding job on all the learning tasks related to this course in social media.	Pintrich et al. (1993); Wolters et al. (1996); Study 1
	SE2	I was certain I could understand the most difficult material presented in social media that was related to this course.	
	SE3	Even in the face of learning difficulties related to this course, I was certain I could overcome it in the process of learning.	
Intrinsic goal orientation (IGO)	IGO1	The most satisfying thing for me when learning for this course was trying to understand the learning materials as thoroughly as possible.	
	IGO2	I used social media for this course because I preferred some materials that really challenged me so I could learn new things.	
	IGO3	I enjoyed acquiring useful knowledge or skills related to the course, even if there was no reward (e.g., a good grade, credit, or a diploma) or approval from others.	
	IGO4	I used social media for this course because I preferred materials that aroused my curiosity, even if it was difficult to learn.	
Task value (TV)	TV1	It was important for me to do well in this course.	
	TV2	I liked the content of this course.	
	TV3	The content of this course was important for my future development.	

Table 5.1(continued) List of Items Measuring Personal Factors

<i>Personal factors related to social media use</i>			
Social media self-efficacy (SMSE)	SMSE1	I could use any new social media tools for learning if I had seen someone else using them before trying it myself.	Chiu & Wang (2008); Compeau & Higgins (1999); Study 1
	SMSE2	I could use any new social media tools for learning even if there is no one around to tell me what to do as I go.	
	SMSE3	I could use any new social media tools for learning if I could ask someone for help when I got stuck.	
	SMSE4	I could use any new social media tools for learning even if I had never used it before.	
	SMSE5	I was confident that I could get information needed for this course by using social media.	
Learning outcome expectations (OE)	OE1	using social media would help me acquire conceptual knowledge.	Paechter et al. (2010); Study 1
	OE2	using social media would help me with my skills regarding how to manage my learning.	
	OE3	using social media would help me with my technology-related skills for learning.	
	OE4	using social media would help me apply my knowledge to solve different problems.	
Attitude (ATT)	ATT1	I looked forward to using social media for a learning task.	Tsai, Lin, & Tsai (2001); Study 1
	ATT2	I would get bored quickly when using social media for learning. (Reversed)	
	ATT3	using social media for learning would be frustrating for me. (Reversed)	
	ATT4	I liked using social media for learning.	

For personal factors related to social media use, EFA results showed that three components were extracted from 22 items, with eigenvalues greater than 1.00 explaining a total of 73.59% of the variance. They corresponded to the six constructs: self-efficacy for learning, intrinsic goal orientation, task value, social media self-efficacy, learning outcome expectations for social media, and attitude

towards using social media for learning, which could be distinguished as personal factors related to learning and personal factors related to social media use. Results of EFA showed that the range of personal factors' loadings on the three constructs was from 0.71 to 0.85, which meets the criterion for acceptable convergent validity. Table 5.2 provides the item descriptive, principal component analysis, mean scale descriptive, and Cronbach α of the measures.

Table 5.2 Components, Factor Loadings, and Descriptive Statistics of Personal Factors ($N = 385$)

Construct & Item	Components						<i>M</i>	<i>SD</i>	α
	1	2	3	4	5	6			
1. SMSE							3.86	0.87	0.90
SMSE4	0.90	-0.04	-0.02	0.00	0.00	0.04	3.84	0.95	
SMSE5	0.89	0.05	-0.01	0.03	-0.05	-0.07	3.85	0.98	
SMSE3	0.85	-0.03	0.01	0.04	0.04	0.00	3.88	1.02	
SMSE2	0.84	0.04	0.04	-0.07	0.03	0.02	3.85	1.02	
2. OE							3.71	0.81	0.90
OE4	0.04	0.90	-0.03	-0.02	-0.01	0.01	3.70	0.94	
OE2	-0.09	0.89	0.02	0.10	0.01	-0.03	3.76	0.92	
OE3	-0.01	0.87	-0.02	0.00	0.00	0.05	3.68	0.93	
OE1	0.08	0.85	0.03	-0.08	0.01	-0.04	3.70	0.90	
3. ATT							3.65	0.70	0.84
ATT2	-0.07	0.01	0.89	0.06	-0.09	-0.05	3.59	0.85	
ATT3	0.06	-0.06	0.85	0.06	0.03	-0.13	3.67	0.83	
ATT1	0.03	0.02	0.78	-0.09	-0.01	0.11	3.69	0.85	
ATT4	0.01	0.03	0.74	-0.02	0.07	0.10	3.65	0.85	
4. IGO							3.78	0.68	0.83
IGO3	-0.02	-0.04	0.02	0.90	-0.10	0.02	3.79	0.79	
IGO4	-0.11	-0.01	0.06	0.78	0.07	0.03	3.73	0.89	
IGO1	0.10	0.03	-0.02	0.78	-0.03	-0.01	3.80	0.81	
IGO2	0.08	0.04	-0.04	0.72	0.09	-0.01	3.81	0.85	
5. TV							3.57	0.85	0.83
TV3	0.01	-0.01	-0.08	-0.02	0.93	-0.05	3.26	1.03	
TV2	0.05	-0.06	0.02	0.00	0.86	0.05	3.66	0.95	
TV1	-0.06	0.08	0.06	0.02	0.79	0.00	3.79	0.98	
6. SE							3.73	0.83	0.83
SE2	-0.07	-0.03	-0.01	0.00	0.00	0.95	3.68	0.98	
SE1	-0.04	0.02	0.00	0.00	0.02	0.88	3.74	0.98	
SE3	0.17	0.01	-0.01	0.05	-0.05	0.71	3.79	0.92	

Table 5.2(continued) Components, Factor Loadings, and Descriptive Statistics of Personal Factors ($N = 385$)

Variance explained (%)	40.63	8.73	7.13	6.18	5.61	5.29			
Eigen-value	8.94	1.92	1.57	1.36	1.24	1.17			

5.2.2.2 Measurement of environmental factors

Environmental factors in this study refer to social media affordances students perceive in the online learning environment constructed with social media by students themselves in the voluntary use context. Individualized affordances refer to actions that involve only one user to enact when using social media. Prominent individualized affordances found in Study 2 were editability, manageability, modality, persistence, and searchability. Shared affordances refer to actions that involve at least two users to enact, including association, scalability, immediacy, interactivity, visibility.

There were 24 items used to measure individualized affordances, and 33 items to measure shared affordances. Measurement items were created from the information elicited by focus group participants in Study 2, as well as existing scales of social media affordances in other contexts, such as social interaction (Fox & McEwan, 2017) and organizational communication (Rice et al., 2017). Items measuring social media affordances began with the opportunity for action with a continuous scale to reflect the extent or degree to which people perceive the affordances, as suggested by Rice et al. (2017). Higher scores in these items indicate greater perceptions of the social media affordances for learning. Table 5.3 presents the list of questionnaire items measuring individualized affordances and shared affordances, respectively.

Table 5.3 Initial List of Items Measuring Social Media Affordances

Construct	Questionnaire items		References
	With the social media tool(s) I used voluntarily for the course I indicated, it was possible for me to ...		
Individualized social media affordances			
Editability (EDIT)	EDIT1	edit before sending out a message, if I made a mistake when creating the message.	Fox & McEwan (2017); Rice et al. (2017); Derived from Study 2
	EDIT2	edit the message I wanted to communicate before I actually presented it.	
	EDIT3	create a message and delete it before sending out.	
	EDIT4	carefully craft my message before sending out.	
	EDIT5	edit others' information after they posted it in a collaborative work.	
	EDIT6	edit my information after posted it.	
	EDIT7	edit my comments and reactions I had made to others.	
	EDIT8	edit others' comments and reactions to me.	
Persistence (PER)	PER1	retrieve past communication and information.	
	PER2	save information to read/watch/view later.	
	PER3	go back and look at information long after the initial communication was done.	
	PER4	have a record of communication that could last long after the initial communication.	
Searchability (SEA)	SEA1	search information or people in search engine by keywords.	
	SEA2	search information or people in site maps or online catalogues.	
	SEA3	locate important information easily.	
	SEA4	search for information or people by following links between content.	
Manageability (MA)	MA1	turn on/off the notifications.	Derived from Study 2
	MA2	adjust the learning speed through forwarding or rewinding.	
	MA3	manage the lists of friends or groups.	
	MA4	share information with or block information from certain users or groups.	

Table 5.3(continued) Initial List of Items Measuring Social Media Affordances

Modality (MOD)	MOD1	acquire knowledge from a single or a combination of different content forms (e.g., text, image, video, audio).	Fox & McEwan (2017); Rice et al. (2017); Derived from Study 2
	MOD2	communicate with others by using a single or a combination of different content forms (e.g., text, image, video, audio).	
	MOD3	deliver my messages by using a single or a combination of different content forms (e.g., text, image, video, audio).	
	MOD4	receive information in a single or a combination of different content forms (e.g., text, image, video, audio).	
Shared social media affordances			
Association (ASSO)	ASSO1	create groups for sharing information related to course study.	Derived from Study 2
	ASSO2	join groups established by others.	
	ASSO3	use groups for learning purposes.	
	ASSO4	communicate and connect with others through groups.	
	ASSO5	follow some experts from my field.	
	ASSO6	follow some knowledgeable users and get updates.	
	ASSO7	follow some accounts.	
	ASSO8	establish direct connections with other users.	
Immediacy (IMM)	IMM1	get responses from others quickly.	Fox & McEwan (2017); Derived from Study 2
	IMM2	get feedback very fast.	
	IMM3	get instant feedback.	
	IMM4	receive immediate updates.	
Interactivity (INT)	INT1	interact with others through chatting, commenting, or other communication.	Rice et al. (2017); Derived from Study 2
	INT2	interact with others through liking, upvoting or other reactions.	
	INT3	share my files, photos, other information with others.	
	INT4	receive files, documents, photos, other information from others.	

Table 5.3(continued) Initial List of Items Measuring Social Media Affordances

Scalability (SCA)	SCA1	deliver my messages to public audiences.	Fox & McEwan (2017); Rice et al. (2017); Derived from Study 2
	SCA2	extend my social network.	
	SCA3	find and connect with people I did not know in person.	
	SCA4	find and connect with helpful people I wasn't aware of before.	
	SCA5	get new knowledge from the references or recommendations.	
	SCA6	get knowledge from different perspectives.	
	SCA7	extend my knowledge network.	
	SCA8	get useful knowledge I wasn't aware of before.	
Visibility (VIS)	VIS1	see others' new updates or posts.	Rice et al. (2017); Derived from Study 2
	VIS2	see the feedback from other users.	
	VIS3	see communication among other users in comments or group discussions.	
	VIS4	see who had "liked" or "followed" particular users or information.	
	VIS5	see other users' evaluation through the recommendations, liking, or tagging.	
	VIS6	present or conceal my identity if I wanted to.	
	VIS7	see the personal profiles of other users.	
	VIS8	see the identity presented or concealed by other users about themselves.	
	VIS9	see the information indicating who a user is.	

Seven affordances emerged, ranked by decreasing mean value: searchability, group association, manageability, post-editability, communication visibility, network scalability, and interactivity, with eigenvalues greater than 1.00 explaining a total of 69.75% of the variance. The results suggest that respondents perceived seven distinct groups of affordances and they perceived some as more possible than others. Some items from different affordances were loaded together and were reconceptualized as new affordances. In particular, two items of manageability (MA1 and MA4), one item measuring editability (EDIT1), one item of modality (MOD3) were loaded together as one factor. Indeed, the content of the 11 items reflects that social media enable users to selectively craft, share, consume, and organize information in different modalities (e.g., text, image, video, audio), which is close to the concept of manageability ($M = 3.50$, $SD = 0.81$). In addition, the other four items of editability (EDIT5 to EDIT8) reflected the concept of post-editability ($M = 3.51$, $SD = 0.84$). Post-editability (POST) suggests the possibility to revise or delete information after it is presented or communicated in social media. One item of visibility (VIS8), two items of immediacy (IMM3 and IMM4), and two items of interactivity (INT1 and INT2) were loaded together as one factor. The content of these five items commonly reflected the concept of interactivity afforded by social media, which refers to the extent to which social media enable users to engage in interaction with other users. Immediacy items suggested that the interaction in social media was immediate, while the visibility item indicated that the visibility of a user's identity was important during the interaction. Thus, these five items were combined as one factor, namely, interactivity ($M = 3.60$, $SD = 0.76$).

Additionally, two items of scalability (SCA2 and SCA3) and two items of association (ASSOC5 and ASSOC 6) were loaded as one factor, which reflected a common concept, namely network scalability ($M = 3.62$, $SD = 0.73$). Network scalability (NET) refers to the possibility to connect and interact with a larger network of people in social media. The inclusion of the four association items indicated that the possibility of establishing direct association was an important element of establishing a larger network. The other four remaining items of association were loaded independently, reflecting a different kind of association, namely, group association ($M = 3.42$, $SD = 0.70$). Group association (GROUP)

was deemed as a relationship established in the form of a group with at least three people, who may or may not know each other.

Last, four remaining items of visibility were also loaded independently as a salient affordance, communication visibility ($M = 3.60$, $SD = 0.76$). Communication visibility (CVIS) reflects the extent to which social media enable people to see the communication behaviors of other users. Taken together, three the seven affordances were distinguished as individualized affordances, including manageability, post-editability, and searchability; the other four affordances were shared affordances, including group association, interactivity, network scalability, and communication visibility. Results of EFA showed that the range of factors loadings on the seven constructs is from 0.72 to 0.78, which meets the criterion for acceptable convergent validity. Table 5.4 provides the item descriptive, principal component analysis, mean scale descriptive, and Cronbach α of the measures.

Table 5.4 Components, Factor Loadings, and Descriptive Statistics of Social Media Affordances ($N = 385$)

Construct and Item	Components							<i>M</i>	<i>SD</i>	α
	1	2	3	4	5	6	7			
1. MA								3.50	0.81	0.90
MA1	0.89	-0.03	0.04	0.00	-0.05	-0.04	0.06	3.52	0.99	
MA4	0.88	-0.04	-0.03	0.01	-0.04	0.02	0.06	3.47	0.95	
MOD2	0.84	0.02	0.03	-0.02	0.06	0.00	-0.07	3.50	0.93	
EDIT1	0.84	0.13	-0.05	-0.06	-0.01	-0.03	0.05	3.39	0.96	
MOD3	0.77	-0.02	0.04	0.06	0.04	0.01	-0.07	3.61	0.98	
2. INT								3.73	0.83	0.83
IMM3	0.11	0.82	-0.01	-0.03	0.06	0.02	-0.07	3.78	1.02	
IMM4	-0.04	0.78	-0.07	0.03	0.04	0.06	0.06	3.76	1.02	
INT1	-0.16	0.78	0.04	0.09	-0.03	-0.09	-0.02	3.52	1.21	
INT2	0.12	0.76	0.02	-0.07	-0.09	0.13	0.05	3.76	0.98	
VIS8	0.05	0.76	0.05	0.04	0.06	-0.04	-0.01	3.81	0.98	
3. POST								3.51	0.84	0.85
EDIT8	-0.06	0.08	0.92	0.02	-0.08	-0.13	0.04	3.36	1.03	
EDIT5	0.09	0.08	0.84	-0.02	0.01	-0.03	-0.09	3.52	0.99	
EDIT7	0.00	-0.07	0.79	-0.02	0.00	0.15	0.05	3.56	0.95	
EDIT6	-0.01	-0.11	0.75	0.04	0.11	0.12	0.03	3.59	0.99	
4. CVIS								3.60	0.76	0.87
VIS4	0.08	-0.02	0.01	0.89	0.05	-0.08	-0.05	3.69	0.87	
VIS3	0.04	0.01	0.04	0.88	-0.02	-0.05	-0.02	3.58	0.90	
VIS2	-0.05	0.00	-0.09	0.82	-0.01	0.13	0.05	3.63	0.88	
VIS1	-0.09	0.08	0.05	0.76	-0.03	0.02	0.04	3.50	0.97	

Table 5.4 (continued) Components, Factor Loadings, and Descriptive Statistics of Social Media Affordances ($N = 385$)

5. NET								3.62	0.73	0.84
SCA3	-0.10	0.07	0.02	0.00	0.84	-0.03	0.04	3.56	0.90	
ASSO6	-0.07	0.02	0.02	-0.05	0.83	0.03	0.06	3.59	0.89	
SCA2	0.11	0.02	-0.06	-0.01	0.82	-0.03	0.00	3.69	0.85	
ASSO5	0.08	-0.08	0.02	0.05	0.78	0.02	-0.06	3.65	0.89	
6. SEA								3.42	0.79	0.82
SEA2	-0.13	0.14	0.09	-0.09	-0.05	0.87	-0.05	3.31	1.04	
SEA4	0.08	-0.03	-0.03	0.01	-0.05	0.80	0.05	3.46	0.97	
SEA3	-0.06	-0.02	-0.01	0.01	0.12	0.77	-0.05	3.39	1.01	
SEA1	0.18	-0.07	-0.07	0.12	-0.02	0.72	0.01	3.52	0.94	
7. GROUP								3.42	0.70	0.76
ASSO4	-0.03	0.07	-0.08	-0.02	0.03	0.01	0.84	3.43	0.84	
ASSO2	-0.04	-0.01	0.01	0.03	0.04	0.00	0.84	3.41	0.83	
ASSO1	0.12	-0.06	0.10	0.00	-0.03	-0.05	0.75	3.41	0.89	
Variance explained (%)	33.07	10.15	6.84	6.02	5.14	4.44	4.10			
Eigenvalue	9.59	2.94	1.98	1.75	1.49	1.29	1.19			

5.2.2.3 Measurement of using SRL strategies

Using SRL strategies refers to a behavior that people employ deliberate learning to manage their learning process. In Study1, the four strategies, namely, goal setting, environment structuring, performance control, and self-evaluation, were derived from prior research in online learning (e.g., Barnard et al., 2009) and were identified as the main SRL strategies. In the following study 2, it was found that these four strategies were more related to the learning process. In addition, students also engaged in regulating the social media use, such as information evaluation, support exchange, and distraction management, when learning with social media in the voluntary context. That is, students self-regulate their learning through both regulation of learning and regulation of social media environment.

Here, regulation of learning was measured as the same SRL strategies used in Study 1, including goal setting, environment structuring, performance control, and self-evaluation. There were 19 items used to measure learning regulation. Regulation of social media environment refers to students taking deliberate actions to manage the learning environment constructed by social media used in the learning process. As uncovered in Study 2, the prominent strategies were information evaluation, support exchange, and distraction management. Regulation of social media environment was measured with 28 items of three strategies. Table 5.5 presents the list of questionnaire items measuring regulation of learning and regulation of social media environment. Higher scores in these items indicate greater engagement in social media regulation.

Table 5.5 List of Items Measuring Using SRL Strategies

Constructs	Sub-constructs	Questionnaire items		References
		When I was voluntarily using social media tool(s) for the course I indicated,		
<i>Regulation of personal learning</i>	Goal setting (GOAL)	GOAL1	I set standards for my learning in social media.	Barnard et al. (2009); Study 1
		GOAL2	I didn't compromise the quality of my learning because it was in social media.	
		GOAL3	I set goals to help me manage study when learning in social media.	
		GOAL4	I set goals of what to learn in social media.	
	Environment structuring (EN)	EN1	I would find a comfortable place to study.	
		EN2	I chose a learning space with few distractions.	
		EN3	I chose a place where I could avoid too many distractions.	
		EN4	I knew where I could study most efficiently.	
	Performance control (PC)	PC1	I used social media to work on extra problems of my course to master the content.	
		PC2	I read aloud the learning materials in social media to fight against distractions.	
		PC3	I prepared my questions and thoughts when joining in an online discussion in social media.	
		PC4	I tried to take notes when I was learning in social media because notes are important for learning in social media.	
PC5		I connected with or follow someone who I thought knowledgeable in social media so that I could consult with him or her when I need help.		
PC6		I allocated extra studying time for my learning in social media because I knew it would be time-demanding.		
PC7		I shared my study problems in social media so that I could figure out what I was struggling with and how to solve my problems.		
PC8		Although the time to use social media for my learning was flexible, I still tried to distribute my studying time evenly across days.		

Table 5.5(continued) List of Items Measuring Using SRL Strategies

Constructs	Sub-constructs	Questionnaire items		References
	Self-evaluation (EVA)	EVA1	I asked myself a lot of questions when learning about the materials in social media.	
		EVA2	I summarized what I learned in social media to examine my understanding.	
		EVA3	I compared with peer learners to find out the difference between my learning in social media and theirs.	
<i>Regulation of social media environment</i>	Information evaluation (IEVA)	IEVA1	I evaluated if the information in social media was credible or not.	Derived from Study 2
		IEVA2	I checked if the information was contributed by credible users.	
		IEVA3	I checked if the information was endorsed by credible users.	
		IEVA4	I checked how many other users liked or upvoted the information.	
	Support exchange (SP)	SP1	I got useful information for my course study from other users in social media.	
		SP2	I got answers to my questions in social media from people I knew in person.	
		SP3	I got answers to my questions in social media from people I didn't know in person.	
		SP4	I shared my knowledge to help others in social media to solve their problems.	
		SP5	I got motivated by stories of other users in social media.	
		SP6	I shared my learning experience in social media to motivate others.	
	Distraction management (DIS)	DIS1	I turned off the notifications to avoid distractions.	
		DIS2	I muted irrelevant social interactions in social media.	
		DIS3	I blocked the distractive influences in social media.	
		DIS4	I avoided being interrupted by irrelevant activities in social media.	

EFA results showed that seven components were extracted from 29 items, with eigenvalues greater than 1.00 explaining a total of 68.22% of the variance. For regulation of learning, which is one category of using SRL strategies, they corresponded to the four strategies of regulation of learning: goal setting, environment structuring, performance control, and self-evaluation. Regarding the other category of using SRL strategies, namely, regulation of social media, and the emerging three components corresponding to the three strategies of regulation of social media, including information evaluation, support exchange, and distraction management. Results of EFA shows that the range of factors loadings on the seven constructs is from 0.58 to 0.80, which meets the criterion for acceptable convergent validity. Table 5.6 provides the item descriptive, principal component analysis, and mean scale descriptive of the measures.

Table 5.6 Components, Factor Loadings, and Descriptive Statistics of SRL Strategies ($N=385$)

Constructs and Items	Components							<i>M</i>	<i>SD</i>	<i>α</i>
	1	2	3	4	5	6	7			
1. PC								3.69	0.89	0.90
PC6	0.84	-0.08	0.02	-0.11	-0.02	0.12	0.05	3.58	1.05	
PC2	0.84	-0.14	0.01	-0.10	0.06	-0.08	0.03	3.52	1.21	
PC5	0.81	0.04	0.00	-0.03	0.09	0.05	-0.12	3.76	1.02	
PC4	0.77	0.12	-0.03	0.10	-0.05	-0.08	-0.01	3.78	1.02	
PC7	0.76	-0.08	-0.02	0.01	0.08	-0.01	0.08	3.64	1.12	
PC3	0.74	0.10	0.00	0.13	-0.07	0.05	-0.11	3.76	0.98	
PC8	0.73	0.08	0.01	0.09	-0.08	-0.08	0.12	3.81	0.98	
2. EN								3.60	0.91	0.88
EN2	0.02	0.88	0.01	-0.08	-0.01	0.00	0.05	3.56	0.97	
EN3	0.02	0.85	0.02	-0.03	-0.04	0.00	0.05	3.59	0.95	
EN1	-0.02	0.84	0.00	0.02	0.00	0.06	-0.07	3.63	0.93	
EN4	-0.03	0.80	0.02	0.02	0.10	0.01	0.00	3.60	0.98	
3. DIS								3.59	0.98	0.87
DIS2	-0.02	0.04	0.91	0.01	-0.04	-0.01	-0.06	3.59	0.96	
DIS3	0.00	-0.11	0.88	0.04	-0.04	0.07	0.04	3.59	0.95	
DIS1	-0.03	0.08	0.81	0.05	0.08	-0.14	-0.02	3.64	0.91	
DIS4	0.05	0.05	0.80	-0.05	-0.03	0.03	0.05	3.52	0.91	
4. IEVA								3.90	0.97	0.82
IEVA2	0.01	-0.04	-0.02	0.88	0.04	0.04	-0.05	3.95	0.93	
IEVA3	0.00	-0.05	0.03	0.87	0.06	0.00	-0.01	3.94	0.93	
IEVA1	-0.06	0.04	0.02	0.85	0.02	-0.06	0.09	3.98	0.89	

Table 5.6 (continued) Components, Factor Loadings, and Descriptive Statistics of SRL Strategies (*N* =385)

IEVA4	0.09	-0.05	0.03	0.58	-0.09	0.10	-0.02	3.72	1.05	
5. SP								3.79	0.95	0.79
SP2	0.07	-0.06	0.04	-0.06	0.81	0.05	-0.03	3.80	0.99	
SP4	0.00	-0.06	0.15	-0.05	0.79	0.09	-0.01	3.80	0.98	
SP1	-0.07	0.07	-0.13	0.10	0.75	-0.13	0.03	3.79	0.97	
SP3	0.08	0.10	-0.06	0.05	0.68	0.01	0.02	3.76	0.96	
6. GOAL								3.42	0.89	0.76
GOAL3	-0.02	-0.04	-0.01	0.03	-0.01	0.84	0.06	3.41	0.89	
GOAL4	0.08	0.08	-0.05	0.04	-0.06	0.83	-0.07	3.43	0.84	
GOAL1	-0.10	0.03	0.01	0.00	0.06	0.74	0.06	3.41	0.83	
7. EVA								3.48	0.91	0.77
EVA2	0.09	0.03	-0.03	0.00	-0.01	-0.07	0.85	3.68	0.98	
EVA1	0.03	-0.05	0.04	0.02	0.01	0.04	0.81	3.55	0.97	
EVA3	-0.09	0.06	-0.01	0.00	0.02	0.09	0.75	3.21	0.98	
Variance explained (%)	32.62	9.62	7.59	5.70	4.84	4.07	3.80			
Eigenvalue	9.46	2.79	2.20	1.65	1.40	1.18	1.10			

5.2.2.4 Measurement of learning satisfaction

Learning satisfaction with social media refers to a positive affective learning outcome that results from a learning experience with social media. Six terms were adapted from Study 1, while two new items were added, drawing from quotes related to learning satisfaction from focus group discussion in Study 2. Higher scores in these items indicate greater learning satisfaction with social media. Table 5.7 presents the list of questionnaire items measuring learning satisfaction, as well as the references.

Table 5.7 List of Items Measuring Learning Satisfaction with Social Media

Construct	Questionnaire items		References
	Regarding my experience of voluntarily using social media for the course I indicated,		
Learning satisfaction with social media (SA)	SA1	I enjoyed my use of social media for this course.	Hong et al. (2016); Piccoli et al. (2013); Chiu et al. (2007); Study 1; Derived from Study 2
	SA2	I had fun learning with social media.	
	SA3	my learning with social media was a pleasant experience.	
	SA4	I am pleased with my learning experience of using social media.	
	SA5	by using social media for this course, I have solved the learning problems I had.	
	SA6	by using social media for this course, I have acquired knowledge and skills I need.	
	SA7	the learning experience in social media stimulated my desire to learn.	
	SA8	overall, social media has met my learning expectations.	

For learning satisfaction, EFA results showed that all 8 items were loaded on one factor, namely, learning satisfaction ($M = 3.48$, $SD = 0.75$), with eigenvalues greater than 1.00 explaining a total of 66.06% of the variance. Results of EFA showed that the range of personal factors' loadings on the three constructs is from 0.71 to 0.85, which meets the criterion for acceptable convergent validity. Table 5.8 provides the item descriptive, principal component analysis, mean scale descriptive, and Cronbach α of the measures.

Table 5.8 Components, Factor Loadings, and Descriptive Statistics of Learning Satisfaction ($N=385$)

Constructs	Items	Components	<i>M</i>	<i>SD</i>	<i>α</i>
		1			
1. SA			3.48	0.75	0.93
	SA1	0.85	3.45	0.97	
	SA4	0.85	3.50	0.94	
	SA2	0.84	3.54	0.92	
	SA8	0.83	3.45	0.91	
	SA7	0.83	3.50	0.94	
	SA6	0.80	3.44	0.90	
	SA5	0.78	3.50	0.88	
	SA3	0.71	3.42	0.91	
Variance explained (%)		66.06			
Eigenvalue		5.285			

5.2.2.5 Demographic information

Participants' demographic information was also sought at the end of the questionnaire. In particular, they were asked to provide information regarding gender, educational status, student status, student identity, and educational background. The questions are presented in Table 5.9.

Table 5.9 List of Questions about Demographic Information

Demographics	Questionnaire items	
Gender	D1	Gender: a) Men, b) Women
Age	D2	Age (open-ended question)
Educational status	D3	Which degree are you currently pursuing? a) Bachelor, b) Master, c) PhD, d) Others
Student status	D4	What is your current student status? a) Full-time student, b) Part-time student
Student identity	D5	Are you an international student? a) International student / Singapore Permanent Resident (PR), b) Singaporean
Educational background	D6	What is your academic background? a) Accountancy and Business, b) Arts, Design & Media, c) Communication Studies, d) Education, e) Engineering, f) Humanities, g) Medicine, h) Social Science, i) Science, j) Sport Science, k) Law, l) Others

To assess if the items reflect the intended construct, face validity of the measurements was evaluated prior to data collection. Three PhD students and two assistant professors in communication and information studies were invited

to discuss the wording of the questions. They were familiar with social media research and experienced with survey development. Minor problems with question wording and survey format were fixed according to the feedback. The implementation of Study 3 was approved by the Institutional Review Board (IRB) of NTU. The approval is attached as Appendix F and the questionnaire used in data collection can be found in Appendix G.

As verified in EFA, three individualized affordances and four shared affordances emerged. In this vein, the investigation of the influences of affordances on using SRL strategies concentrated on the influences of the seven affordances. Accordingly, the hypotheses about the influences social media affordances on using SRL strategies (H5 to H8) were revised as:

Hypothesis 5: Individualized social media affordances, including a) manageability, b) post-editability, and e) searchability, are positively associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

Hypothesis 6: Individualized social media affordances, including a) manageability, b) post-editability, and e) searchability, are positively associated with the extent to which students engage in regulation of social media use when voluntarily using social media for formal learning.

Hypothesis 7: Shared social media affordances, including a) group association, b) interactivity, c) network scalability, and e) communication visibility, are positively associated with the extent to which students engage in regulation of learning when voluntarily using social media for formal learning.

Hypothesis 8: Shared social media affordances, including a) group association, b) interactivity, c) network scalability, and e) communication visibility, are positively associated with the extent to which students engage in regulation of social media use when voluntarily using social media for formal learning.

Consequently, the conceptual model was revised, as shown in Figure 5.2.

Figure 5.2 The revised conceptual model

5.2.3 Data Collection

After obtaining the IRB approval, data of Study 3 was collected from May to July in 2018. The recruitment information was disseminated through word-of-mouth, email invitations, social media, campus advertisements, and the WKWSCI subject pool. Qualified participants should be aged 21 and above and should have the experience of voluntarily using social media for course study in school. Participation was completely voluntary and anonymous. Similar to Study 1, data was collected via a mixed-mode survey, in which participants could choose to complete the questionnaire either online or paper-based. The formats of both online and paper-based survey were also kept unified to minimize the mode differences. In total, there were 478 responses from qualified participants, including 326 responses from the online survey and 152 responses from the paper-based survey. Similar to Study 1, one-way ANOVA comparison of means was conducted to compare online and paper-based data collection (Schillewaert & Meulemeester, 2005). The results indicated no significant differences in measurement between data collected from the paper-based and online survey at the $p < 0.05$ level ($F(1, 476) = 3.04, p = 0.082$).

Before answering the questionnaire, all participants were presented with a consent form including the information regarding the purpose of the study, privacy and confidentiality of the participation. Participants who agreed to participate in the research project could proceed to answer the questionnaire. The entire survey lasted approximately 30 minutes to complete.

5.2.4 Statistical Analysis

According to Anderson and Gerbing (1988), the first step of structural equation modeling is to assess the measurement modeling. Confirmatory factor analysis was conducted to verify the measurement model and the quality of the instrument. After the measurement model were validated, the results are used as input to estimate the relationship among constructs in the structural model. Finally, following Keith's (2015) recommendation to examine multiple indices of model fit, a few model fit indices were employed to assess the model fit of the measurement model and the structural model. In particular, the chi-square and the degree of freedom ratio, i.e., χ^2/df , was used to measure the "badness of

model fit”; the comparative fit index (CFI) was used to measure the fit of a target model to a null model; the Tucker-Lewis Index (TLI) was used to measure the parsimony of the model; and the root mean square error of approximation (RMSEA) was used to measure the residual. Informed by Keith (2015), a good model fit should have the χ^2/df less than 3, the CFI and TLI greater than 0.9, and RMSEA less than 0.08. All analyses were conducted using AMOS software.

5.3 Results

This section presents the descriptive analysis of the sample and the results of the structural equation modeling that was used to test the hypotheses and address the research questions proposed in the conceptual model of Study 3.

5.3.1 Descriptive Analysis

The survey received 478 responses from qualified participants. After eliminating cases with missing values of measurement items exceeding 10% (Bennett, 2001), there were 385 valid responses used for the data analysis. To handle the missing values, mean values were substituted for missing data in the dataset. As stated earlier in Study 1, using mean imputation can maintain the sample size and the sample means of the variables. The potential of bias in the variance and standard error of the variable and its correlation with other variables can be mitigated by larger sample size (i.e., more than 50) and a small proportion of missing data (i.e., less than 10%) (Cheema, 2014; Eekhout et al., 2014). In this vein, the mean imputation is appropriate in handling missing data, since there were less than 10% missing data in 385 observations.

Of the 385 valid responses, 161 (42%) were from men and 224 (58%) were from women. The majority of the respondents (91%, $n = 349$) were between 21 and 25 years old. In terms of educational status, most of the respondents were undergraduate students (78%, $n = 301$). Full-time students ($n = 371$) took up about 96% of the sample students. In addition, there were 36% ($n = 138$) respondents identified as international students while 64% ($n = 247$) were Singaporean. The top three most represented educational background were communication studies (34%, $n = 130$), engineering (23%, $n = 87$), and

accountancy and business (12%, $n = 48$). The demographic details of the sample are summarized in Table 5.10.

Table 5.10 Sample Demographics ($N = 385$)

Demographic variable	Count	%
Gender		
Men	161	42%
Women	224	58%
Age		
21- 25	349	91%
26-30	17	4%
31 or over	19	5%
Educational status		
Bachelor	301	78%
Master	53	14%
PhD	22	6%
Others	9	2%
Student status		
Full-time student	371	96%
Part-time student	14	4%
Student identity		
International student / Singapore Permanent Resident (PR)	138	36%
Singaporean	247	64%
Educational background		
Accountancy and Business	48	12%
Arts, Design & Media	9	2%
Communication Studies	130	34%
Education	9	2%
Engineering	87	23%
Humanities	12	3%
Medicine	6	2%
Social Science	33	9%
Science	18	5%
Sport Science	3	1%
Others	30	8%
Total	385	

Figure 5.3 presents the frequency of the general use of social media and the voluntary use of social media for formal learning. Regarding social media use in general, the most frequently used social media was instant messaging tools, which were used almost more than 5 times a day ($M = 5.84$, $SD = 0.51$). Other social media that students used a few times a day were social networking sites ($M = 5.16$, $SD = 1.07$), resource sharing sites ($M = 4.96$, $SD = 1.06$), and photo sharing sites ($M = 4.77$, $SD = 1.50$). Regarding social media used voluntarily for formal learning, the most frequently used tools were also instant messaging tools ($M = 4.99$, $SD = 1.41$), which were used a few times a day for learning purposes. Followed by instant massaging tools, web-based/cloud-computing collaborating tools ($M = 4.14$, $SD = 1.68$), resource sharing sites ($M = 4.14$, $SD = 1.68$) a few times a week.

Note: 1=Never 2=Very infrequently (less than once a month or never) 3=Rarely (a few times a month) 4=Sometimes (a few times a week) 5= Often (a few times a day) 6=Very frequently (more than 5 times a day)

Figure 5.3 Means of frequencies of using each type of social media ($N = 385$)

5.3.2 *The Measurement Model*

The measurement model specifies the correspondences between unobserved constructs (i.e., the factors) and their indicators (i.e., the items). To assess the composite reliability of the construct-item correspondences, as well as the convergent and discriminant validity, confirmatory factor analysis (CFA) was conducted. For a construct, the indicators are expected to be highly correlated with each other and with the intended construct. The construct should also explain more than 50% of the variance of each reflective item, i.e., the average variance extracted (AVE) should be greater than 0.5 (Hair et al., 1995). To assess the correlations among items of the same construct, composite reliability (CR) is required to be greater than 0.7 (Hair et al., 1995). If high AVE and high CR are satisfied, the convergent validity of the measurement can be confirmed. To confirm the discriminant validity of measurement, the correlations between constructs should be less than the square root of AVE (Hair et al., 1995).

The results of CFA further verified the validity and reliability of the measurement model. All factor loadings were significant and exceeded the recommended minimal value of 0.5. Table 5.11 reports the result of the factor loadings of the measurement model. In addition, Table 5.12 shows that the CRs range from 0.77 to 0.93, the AVEs range from 0.53 to 0.70, and all the cross-correlations were less than the square roots of the construct AVEs. Thus, the scale reliability and convergent and discriminant validity were further confirmed. As indicated in Table 5.13, the measurement model was good, with all fit indices meeting the recommended value: $\chi^2(df) = 2602.42$, $df = 1895$, $\chi^2/df = 1.37$, CFI = 0.95, TLI = 0.95, RMSEA = 0.03).

Table 5.11 The Factor Loadings of the Measurement Model ($N = 385$)

Constructs	Items	Unstandardized loading	Standard error	Standardized loading	<i>p</i> value
Self-efficacy (SE)	SE1	1.00		0.85	
	SE2	0.97	0.06	0.82	***
	SE3	0.79	0.06	0.71	***
Intrinsic goal orientation (IGO)	IGO1	0.97	0.07	0.75	***
	IOG2	1.00		0.74	
	IGO3	0.95	0.07	0.76	***
	IGO4	1.00	0.08	0.70	***
Task value (TV)	TV1	1.00		0.75	
	TV2	1.08	0.07	0.84	***
	TV3	1.09	0.08	0.78	***
Social media self-efficacy (SMSE)	SMSE1	1.00	0.05	0.83	***
	SMSE2	1.00		0.83	
	SMSE3	0.95	0.05	0.84	***
	SMSE4	0.97	0.05	0.84	***
Learning outcome expectation (OE)	OE1	0.91	0.05	0.81	***
	OE2	0.95	0.05	0.84	***
	OE3	0.98	0.05	0.85	***
	OE4	1.00		0.86	
Attitude (ATT)	ATT1	1.07	0.08	0.76	***
	ATT2	1.04	0.08	0.74	***
	ATT3	1.00		0.73	
	ATT4	1.11	0.08	0.79	***

Table 5.11(continued) The Factor Loadings of the Measurement Model ($N = 385$)

Manageability (MA)	EDIT1	1.00		0.76	
	MA1	1.15	0.07	0.85	***
	MA2	1.12	0.06	0.86	***
	MA4	1.04	0.06	0.81	***
	MOD3	1.03	0.07	0.77	***
Post-editability (POST)	EDIT5	1.00		0.76	
	EDIT6	1.10	0.07	0.84	***
	EDIT7	1.04	0.06	0.84	***
	EDIT8	0.96	0.07	0.71	***
Searchability (SEA)	SEA1	1.02	0.07	0.82	***
	SEA2	0.88	0.07	0.66	***
	SEA3	1.00		0.78	
Communication visibility (CVIS)	VIS6	1.00		0.71	
	VIS7	1.00	0.07	0.78	***
	VIS8	1.09	0.07	0.82	***
	VIS9	1.08	0.07	0.85	***
Group association (GROUP)	ASSO1	1.00		0.63	
	ASSO2	1.34	0.12	0.79	***
	ASSO4	1.22	0.11	0.76	***

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.11(continued) The Factor Loadings of the Measurement Model ($N = 385$)

Interactivity (INT)	IMM3	0.91	0.07	0.73	***
	IMM4	1.03	0.08	0.67	***
	INT1	1.00		0.77	
	INT2	0.99	0.07	0.76	***
	VIS8	0.94	0.06	0.76	***
Network scalability (NET)	ASSO5	1.04	0.07	0.76	***
	ASSO6	1.03	0.07	0.75	***
	SCA2	1.00		0.77	
	SCA3	1.01	0.07	0.73	***
Regulation of learning (RL)	EN	1.11	0.07	0.81	***
	EVA	1.08	0.07	0.80	***
	GOAL	1.00		0.76	
	PC	1.06	0.07	0.80	***
Regulation of social media (RSM)	DIS	0.99	0.06	0.81	***
	IEVA	1.00		0.82	
	SP	0.95	0.06	0.80	***
Learning satisfaction (SA)	SA1	1.10	0.06	0.84	***
	SA2	1.01	0.06	0.81	***
	SA3	0.82	0.06	0.66	***
	SA4	1.05	0.06	0.83	***
	SA5	0.88	0.06	0.74	***
	SA6	0.94	0.06	0.77	***
	SA7	1.01	0.06	0.80	***
	SA8	1.00		0.81	

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.12 Correlation Matrix and Validity Assessment ($N = 385$)

	CR	AVE	RSM	IGO	SE	TV	OE	SMSE	POST	SEA	NSCA	CVIS	INT	MAN	ATT	SA	RL	GROUP
RSM	0.85	0.66	0.81															
IGO	0.83	0.55	0.52	0.74														
SE	0.83	0.63	0.42	0.57	0.79													
TV	0.83	0.63	0.51	0.47	0.43	0.79												
OE	0.90	0.70	0.55	0.52	0.48	0.59	0.84											
SMSE	0.90	0.70	0.55	0.61	0.48	0.54	0.61	0.83										
POST	0.87	0.62	0.42	0.45	0.43	0.41	0.56	0.46	0.79									
SEA	0.80	0.57	0.52	0.53	0.46	0.59	0.72	0.56	0.55	0.75								
NSCA	0.84	0.57	0.45	0.58	0.55	0.58	0.63	0.55	0.53	0.58	0.75							
CVIS	0.87	0.63	0.49	0.55	0.51	0.46	0.50	0.49	0.47	0.54	0.58	0.79						
INT	0.86	0.55	0.33	0.39	0.43	0.21	0.22	0.22	0.31	0.23	0.31	0.49	0.74					
MAN	0.90	0.65	0.56	0.51	0.42	0.57	0.63	0.58	0.46	0.64	0.50	0.48	0.26	0.81				
ATT	0.84	0.57	0.52	0.59	0.54	0.43	0.55	0.50	0.47	0.53	0.59	0.50	0.35	0.49	0.75			
SA	0.93	0.61	0.59	0.61	0.46	0.58	0.62	0.59	0.43	0.68	0.52	0.51	0.33	0.70	0.58	0.78		
RL	0.87	0.63	0.43	0.59	0.58	0.46	0.47	0.51	0.44	0.40	0.51	0.53	0.59	0.40	0.55	0.46	0.79	
GROUP	0.77	0.53	0.49	0.46	0.41	0.43	0.41	0.41	0.40	0.42	0.52	0.45	0.44	0.45	0.52	0.48	0.52	0.73

Table 5.13 The Recommended and Actual Values of Model Fit Indices of the Measurement model (Keith, 2015)

Fit index	$\chi^2(df)$	χ^2/df	CFI	TLI	RMSEA
Recommended value		< 3	> .90	> .90	< .08
Measurement model	2602.42 (1895)	1.37	.95	.95	.03

To further test for multicollinearity among predictors, tolerance and variance inflation factors (VIF) were also examined to check if there is multicollinearity problem in the model. Tolerance was used to determine whether each variable is independent from other variables, with a value ranging from 0 (not independent) to 1 (completely independent). The variance inflation factor (VIF) is “an index of the amount that the variance of each regression coefficient is increased over that with uncorrelated independent variables” (Cohen et al., 2003, p. 423). A value for tolerance and VIF should be less than the conservative threshold of 5 to avoid the multicollinearity issue (Cohen et al., 2003). Table 5.14 shows that there were no multicollinearity issues as the VIFs were less than 5 (Hair et al., 2010) and tolerance values were larger than 0.2 (Hair et al., 2010).

Table 5.14 Multicollinearity diagnostics ($N = 385$)

Independent variable	Dependent variable			
	Learning satisfaction		Regulation of learning / Regulation of social media environment	
	Tolerance	VIF	Tolerance	VIF
Regulation of learning	0.49	2.05		
Regulation of social media	0.49	2.05		
Self-efficacy			0.45	2.21
Intrinsic goal orientation			0.52	1.92
Task value			0.56	1.79
Social media self-efficacy			0.55	1.83
Learning outcome expectation			0.57	1.76
Attitude			0.58	1.74
Manageability			0.50	2.02
Post-editability			0.66	1.52
Searchability			0.45	2.22
Communication visibility			0.59	1.70
Group association			0.54	1.84
Interactivity			0.42	2.36
Network scalability			0.57	1.77

5.3.3 The Structural Model

Structural equation modeling (SEM) was employed to evaluate the significance of the proposed model and the hypotheses of the relationships. As indicated in Table 5.15, all the fit indices (i.e., χ^2/df ratio, CFI, TLI, and RMSEA) were greater than the recommended thresholds (Keith, 2015). That is, results of the SEM suggest that the hypothesized model was a good fit with the data.

Table 5.15 The Recommended and Actual Values of Model Fit Indices of the Structural Model (Keith, 2015)

Fit index	$\chi^2(df)$	χ^2/df	CFI	TLI	RMSEA
Recommended value		< 3	> .90	> .90	< .08
Structural model	3274.50 (1951)	1.68	.91	.91	.04

The results of SEM for the hypothesized model are presented in Figure 5.4 and Figure 5.5. The detailed results of the specification of the model are presented in Table 5.16. The correlations between exogenous variables were presented in Table 5.17. Here, self-efficacy for learning ($\beta = 0.18, p < 0.01$) and intrinsic goal orientation ($\beta = 0.15, p < 0.05$) had significant direct associations with regulation of learning while there was no significant association between task value and regulation of learning ($\beta = 0.11, p = 0.09$). Thus, Hypothesis 1a) and Hypothesis 1b) were supported, while Hypothesis 1c) was not supported. However, task value were significantly associated with regulation of social media ($\beta = 0.14, p < .005$), while self-efficacy for learning ($\beta = -0.04, p = 0.53$) and intrinsic goal orientation ($\beta = 0.10, p = 0.24$) showed no significant association with regulation of social media environment. Hence, Hypothesis 2a) and Hypothesis 2b) were not supported, while Hypothesis 2c) was supported.

Regarding the influences of personal factors related to social media use, social media self-efficacy ($\beta = 0.13, p = 0.06$), learning outcome expectations ($\beta = 0.06, p = 0.41$), and attitude ($\beta = 0.12, p = 0.08$) were not significantly related to regulation of learning, indicating no support for Hypothesis 3a), 3b), and 3c). However, social media self-efficacy ($\beta = 0.17, p < 0.05$) and attitude towards using social media for learning ($\beta = 0.16, p < 0.05$) have significant associations

with regulation of social media environment; no significant relationship was found between learning outcome expectations and regulation of social media ($\beta = 0.15, p = 0.05$). Accordingly, Hypothesis 4a) and Hypothesis 4c) were supported, while Hypothesis 4b) was not supported.

In terms of the influences of individualized social media affordances, only manageability was found to be significantly related to regulation of social media ($\beta = 0.22, p < 0.01$). However, manageability had no significant association with regulation of learning ($\beta = -0.06, p = 0.40$). For the other two individualized social media affordances, namely post-editability ($\beta = 0.04, p = 0.51$) and searchability ($\beta = -0.09, p = 0.24$), no significant associations were found between them with regulation of learning. There were also no significant associations found between post-editability ($\beta = 0.00, p = 0.97$) and searchability ($\beta = 0.09, p = 0.30$) and regulation of social media. Thus, Hypothesis 5a), 5b), 5c), 6b), and 6c) were not supported while Hypothesis 6a) was partially supported.

In terms of the influences of shared social media affordances, the affordance of interactivity was significantly associated with regulation of learning ($\beta = 0.36, p < .001$), while the affordance of group association was significantly associated with regulation of social media. There were no significant relationships found between communication visibility ($\beta = 0.05, p = 0.51$), group association ($\beta = 0.12, p = 0.08$), network scalability ($\beta = 0.02, p = 0.79$), and regulation of learning. No significant association between communication visibility ($\beta = 0.10, p = 0.20$), interactivity ($\beta = 0.05, p = 0.41$), and network scalability ($\beta = -0.14, p = 0.08$) and regulation of social media environment were found. Therefore, Hypothesis 7c) and Hypothesis 8b) were supported, while Hypothesis 7a), 7b), 7d), 8a), 8c), and 8d) were not supported.

With regard to the use of SRL strategies, regulation of learning ($\beta = 0.22, p = 0.001$) and regulation of social media environment ($\beta = 0.54, p < 0.001$) were found to be significantly associated with learning satisfaction with social media in the voluntary context, indicating support for Hypothesis 9 and Hypothesis 10. To summarize, the results of hypotheses in the conceptual model are presented in Table 5.18.

Figure 5.4 SEM results of the integrated model

Figure 5.5 Results of the hypotheses testing

Table 5.16 Path Coefficients in Model of Figure 5.4 ($N = 385$)

Path			Unstandardized	Standard error	Standardized	<i>p</i> value
Self-efficacy for learning	->	Regulation of learning	0.13	0.05	0.18	**
Intrinsic goal orientation	->		0.15	0.07	0.15	*
Task value	->		0.09	0.05	0.11	0.09
Social media self-efficacy	->		0.10	0.05	0.13	0.06
Learning outcome expectations	->		0.04	0.05	0.06	0.41
Attitude	->		0.12	0.07	0.12	0.08
Manageability	->		-0.05	0.06	-0.06	0.40
Post-editability	->		0.03	0.05	0.04	0.51
Searchability	->		-0.07	0.06	-0.09	0.24
Communication visibility	->		0.04	0.06	0.05	0.51
Group association	->		0.14	0.08	0.12	0.08
Interactivity	->		0.28	0.05	0.36	***
Network scalability	->		0.02	0.07	0.02	0.79

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.16(continued) Path Coefficients in Model of Figure 5.4 ($N = 385$)

Path			Unstandardized	Standard error	Standardized	p value
Self-efficacy for learning	->	Regulation of social media environment	-0.04	0.06	-0.04	0.53
Intrinsic goal orientation	->		0.10	0.09	0.10	0.24
Task value	->		0.13	0.07	0.14	*
Social media self-efficacy	->		0.13	0.06	0.17	*
Learning outcome expectations	->		0.12	0.06	0.15	0.05
Attitude	->		0.18	0.08	0.16	*
Manageability	->		0.20	0.07	0.22	**
Post-editability	->		0.00	0.06	0.00	0.97
Searchability	->		0.08	0.08	0.09	0.30
Communication visibility	->		0.10	0.08	0.10	0.20
Group association	->		0.21	0.10	0.17	*
Interactivity	->	Learning satisfaction	0.05	0.06	0.05	0.41
Network scalability	->		-0.15	0.08	-0.14	0.08
Regulation of learning	->		0.25	0.06	0.22	***
Regulation of social media	->		0.54	0.06	0.54	***

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.17 Correlations in the Structural Model of Figure 5.4 ($N = 385$)

Correlations between variables			Unstandardized	Standard error	Standardized	<i>p</i> value
Intrinsic goal orientation	<-->	Self-efficacy	0.29	0.04	0.57	***
Intrinsic goal orientation	<-->	Task value	0.22	0.03	0.47	***
Self-efficacy	<-->	Task value	0.26	0.04	0.43	***
Attitude	<-->	Learning outcome expectation	0.27	0.04	0.55	***
Attitude	<-->	Social media self-efficacy	0.26	0.04	0.50	***
Learning outcome expectation	<-->	Social media self-efficacy	0.42	0.05	0.61	***
Manageability	<-->	Post-editability	0.25	0.04	0.45	***
Manageability	<-->	Searchability	0.37	0.04	0.64	***
Post-editability	<-->	Searchability	0.32	0.04	0.55	***
Group association	<-->	Network scalability	0.18	0.03	0.52	***
Group association	<-->	Communication visibility	0.16	0.03	0.45	***
Group association	<-->	Interactivity	0.18	0.03	0.44	***
Network scalability	<-->	Communication visibility	0.26	0.03	0.58	***
Network scalability	<-->	Interactivity	0.16	0.03	0.31	***
Communication visibility	<-->	Interactivity	0.26	0.04	0.49	***
Group association	<-->	Manageability	0.17	0.03	0.45	***
Group association	<-->	Manageability	0.16	0.03	0.40	***
Group association	<-->	Searchability	0.17	0.03	0.42	***
Manageability	<-->	Network scalability	0.24	0.03	0.49	***
Manageability	<-->	Communication visibility	0.24	0.04	0.48	***

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.17(continued) Correlations in the Structural Model of Figure 5.4 ($N = 385$)

Correlations between variables			Unstandardized	Standard error	Standardized	<i>p</i> value
Manageability	<-->	Interactivity	0.15	0.04	0.27	***
Network scalability	<-->	Post-editability	0.26	0.04	0.53	***
Network scalability	<-->	Searchability	0.29	0.04	0.57	***
Post-editability	<-->	Communication visibility	0.24	0.04	0.47	***
Post-editability	<-->	Interactivity	0.19	0.04	0.31	***
Communication visibility	<-->	Searchability	0.28	0.04	0.53	***
Searchability	<-->	Interactivity	0.14	0.04	0.23	***
Intrinsic goal orientation	<-->	Attitude	0.23	0.03	0.59	***
Intrinsic goal orientation	<-->	Learning outcome expectation	0.26	0.04	0.52	***
Intrinsic goal orientation	<-->	Social media self-efficacy	0.33	0.04	0.61	***
Self-efficacy	<-->	Attitude	0.27	0.04	0.54	***
Self-efficacy	<-->	Learning outcome expectation	0.32	0.04	0.48	***
Self-efficacy	<-->	Social media self-efficacy	0.33	0.05	0.48	***
Task value	<-->	Attitude	0.19	0.03	0.43	***
Task value	<-->	Learning outcome expectation	0.35	0.04	0.59	***
Task value	<-->	Social media self-efficacy	0.34	0.05	0.54	***

Note: * $p < 0.05$, ** $p < 0.01$ *** $p < 0.001$.

Table 5.18 Results of Hypotheses Testing

Hypothesis	Independent Variable	Dependent Variable	Result
Hypothesis 1	a) Self-efficacy for learning	Regulation of learning	Supported
	b) Intrinsic goal orientation		Supported
	c) Task value		Not supported
Hypothesis 2	a) Self-efficacy for learning	Regulation of social media environment	Not supported
	b) Intrinsic goal orientation		Not supported
	c) Task value		Supported
Hypothesis 3	a) Social media self-efficacy	Regulation of learning	Not supported
	b) Learning outcome expectations		Not supported
	c) Attitude		Not supported
Hypothesis 4	a) Social media self-efficacy	Regulation of social media environment	Supported
	b) Learning outcome expectations		Not supported
	c) Attitude		Supported
Hypothesis 5	a) Manageability	Regulation of learning	Not supported
	b) Post-editability		Not supported
	c) Searchability		Not supported
Hypothesis 6	a) Manageability	Regulation of social media environment	Supported
	b) Post-editability		Not supported
	c) Searchability		Not supported
Hypothesis 7	a) Communication visibility	Regulation of learning	Not supported
	b) Group association		Not supported
	c) Interactivity		Supported
	d) Network scalability		Not supported
Hypothesis 8	a) Communication visibility	Regulation of social media environment	Not supported
	b) Group association		Supported
	c) Interactivity		Not supported
	d) Network scalability		Not supported
Hypothesis 9	Regulation of learning	Learning satisfaction	Supported
Hypothesis 10	Regulation of social media environment		Supported

5.4 Discussion

This section discusses the results of Study 3, which has examined an integrated model of using SRL strategies in the context of voluntary use of social media for formal learning. In particular, the objective of Study 3 was to test an integrated model that specifies the influences of two categories of personal factors (i.e., personal factors related to learning and personal factors related to social media use), and two categories of environmental factors (i.e., individualized social media affordances and shared social media affordances) on using two categories of SRL strategies (i.e., regulation of learning and regulation of social media environment, as well as the effects of using SRL strategies on learning satisfaction with social media. The aim of the integrated model is to test the viability of the social cognitive theory for explaining the influential factors and effects of using SRL strategies in the context of voluntarily using social media for formal learning. A survey study was conducted to collect data for model testing. The results of structural equation modeling empirically validated that the model fits well with the data. This suggests that both personal factors and social media affordances can exert influences on the use of SRL strategies, which in turn lead to a higher extent of learning satisfaction with social media. The following subsections discuss the results in detail.

5.4.1 *The influences of Personal Factors on Using SRL Strategies*

The influences of personal factors related to learning and personal factors related to social media use on the use of SRL strategies have been examined and confirmed in Study 1. As new SRL strategies were uncovered in Study 2, the SRL strategies were categorized into two categories. The first category is regulation of learning, which includes goal setting, environment structuring, performance control, and self-evaluation, and regulation of social media environment; the other category is regulation of social media environment, which includes information evaluation, support exchange, and distraction management in social media. Study 3 extends the investigation in Study 1 by examining the influences of personal factors on these two self-regulation behaviors were examined.

Among the personal factors related to learning, the findings suggest that self-efficacy for learning and intrinsic goal orientation exert strong influences on the behavior of regulation of learning. This is in line with Study 1, which has investigated the influences of the personal factors on the use of specific strategies related to regulation of learning. The results of Study 1 indicated that students who have high self-efficacy for learning were more likely to engage in environment structuring, and students with higher intrinsic goal orientation would be more likely to engage in SRL strategies of goal setting and performance control when they voluntarily use social media for formal learning. Here it is further validated in Study 3 that self-efficacy for learning and intrinsic goal orientation are important factors that related to the extent to which students engage in regulation of learning in general. However, these two personal factors were not related to the behavior of regulating social media environment. This is out of expectation as prior research suggested that students with self-efficacy and intrinsic goal orientation were more self-regulated in online course activities (e.g., Dabbagh & Kitsantas, 2011). The findings in this study suggest that in the voluntary context, students' learning in social media learning experience is more dynamic than the mandatory context. In particular, students need to construct and manage a social media learning environment by themselves. However, as found in this study, the engagement of regulating social media environment was influenced by the personal factors related to learning in terms of self-efficacy for learning and intrinsic goal orientation. Thus, while these personal factors were significant predictors of regulation of learning, other factors should be taken into consideration when explaining regulation of the social media environment, which is the other important dimension of regulation when learning with social media.

In addition, task value was found to exert a significant positive influence on regulation of social media environment. That is, a student who has a higher value of a course will be more likely to engage in regulating the social media environment to be more credible, supportive, and less distractive for their learning. While the relationship between task value and performance control was negative, it was expected that students with higher task value of a learning task might use combined

strategies to regulate their learning. However, task value was found to exert no influence on regulation of learning. This is inconsistent with previous studies that suggest the importance of task value in students' self-regulation when taking an online course (e.g., Chiu & Wang, 2008). One possible explanation is that when using social media voluntarily for formal learning, learning needs are still much related to the structural course design. Thus, students with a higher evaluation of the value of the learning task in social media may just stick to the learning tasks designed by the course design with less regulation of learning. On the other hand, students who perceived a higher value of the learning task may care more about the effectiveness of learning with social media. Thus, students may be more active to engage in evaluating credible learning content, seeking and offering support and manage distractions that are unrelated to learning.

Among the personal factors related to social media use, social media self-efficacy and attitude towards using social media for learning were found to exert a significant influence on the regulation of social media environment. However, both social media efficacy and attitude exert no influences on regulation of learning. This is contrary to expectation as in Study 1, social media self-efficacy was found to be one of the most influential personal factor related to social media use that exerted influence on the degree to which SRL strategies related to regulation of learning, involving goal setting, performance control, and self-evaluation. In addition, Study 1 also found that attitude was an influential predictor of the use of all four SRL strategies related to regulation of learning. One possible explanation can be that the inclusion of environmental factors in Study 3 may account for the influence of social media self-efficacy and attitude on regulation of learning. Put differently, the influences of social media self-efficacy and attitude towards using social media on regulation of learning may be fully mediated by social media affordances, which warrants more nuanced investigation. On the other hand, and the results suggest that social media self-efficacy and attitude can exert influence on regulation of social media environment, which are consistent with recent studies on social media use. In terms of self-efficacy, research has indicated that users with higher social media self-efficacy are more active in evaluating or verifying the online information (Hocevar

et al, 2014). As suggested in Eastin and LaRose (2005), “Self-efficacy determines what and how often a person engages in a given behavior, the amount of effort and persistence put forth when faced with obstacles, and finally, the mastery of the behavior” (p. 980). This study further shows that social media self-efficacy also affects the extent to which students engage in regulating the social media environment to be with more credible learning resources, more support exchange, and fewer distractions. In terms of attitude, it has been found that people who have favorable attitude towards using a social media platform for learning are more likely to engage in continuous learning on that platform (e.g., Hong et al., 2016; Mao, 2014). This study provides further evidence that a student with more favorable attitude towards using social media for learning will be more active in using SRL strategies to regulate the social media learning environment in the voluntary context.

Unexpectedly, there were no significant influences exerted by learning outcome expectations on regulation of learning and regulation of social media environment. In Study 1, it was also found that learning outcome expectations for social media could exert influence on the extent of using SRL strategies of environment structuring, performance control, and self-evaluation. One possible explanation is that the influences of learning outcome expectations may be mediated by social media affordances. For example, prior research has suggested that learning outcome expectations were related to students’ engagement in interacting with instructors and peer students in an online course (Paechter et al., 2010). It is also found in this study that interactivity afforded by social media was directly associated with regulation of learning. Thus, it is possible that these personal factors related to social media may be mediated by social media affordances to influence the regulation of learning and the regulation of social media environment, which calls for future research to investigate the more nuanced relationships among these factors.

5.4.2 The Influences of Environmental Factors on Using SRL Strategies

Building on the findings in Study 2, Study 3 further identified seven social affordances that are conceptually and empirically distinct in the voluntary context as the environmental factors. In particular, a large set of items for assessing social

media affordances were developed to elicit respondents' perceived affordances in a quantitative manner. This investigation identified seven social media affordances which can be categorized into individualized and shared affordances. Individualized affordances include manageability, post-editability, and searchability, while shared affordances consist of communication visibility, group association, interactivity, and network scalability. Based on the EFA and CFA analyses, two items of manageability, two items of modality and one item of visibility were loaded together as one individualized affordance of manageability; two items of scalability and two items of association were loaded as one shared affordance of network scalability; and one item of visibility, two items of immediacy, and two items of interactivity were loaded together as one shared affordance of interactivity. This indicates that these affordances may not be empirically distinct concepts as presumed in the earlier qualitative study. This is inconsistent with the distinct affordances referenced in prior research (Rice et al., 2017; Treem & Leonardi, 2012). It is possible that the items to measure these affordances may not be distinct enough to separate these affordances. Additionally, for editability, scalability, association, and visibility, part of their measurement items remained, indicating the salience of some aspects of these affordances in terms of post-editability, network scalability, group association, and communication visibility.

Among the individualized social media affordances, no significant associations were found between them with the regulation of learning. This is inconsistent with prior research which has suggested that affordances such as post-editability in social media could be used by students to support regulation of personal learning such as self-evaluation (Dabbagh & Kitsantas, 2011). It is possible that these individualized social media affordances may only influence the regulation of learning depending on students' motivational beliefs. For example, for a student with less self-efficacy for learning, even if he or she has a higher awareness of the individualized affordances of social media, it is still unlikely that the student would be active to engage in regulation of learning.

Regarding the influences on regulation of social media environment, one individualized affordance, the affordance of manageability, was found to be

significant. This is not surprising as research on technology affordances has suggested that the possibility to manage information and users in social media would enable users to strategically use social media to manage life-work balances and interpersonal relationships (Gibbs et al., 2013). This study further suggests that manageability is important for students to engage in regulation of social media environment to reach a balance of social and learning use of social media. There are no significant influences exerted post-editability and searchability on the regulation of social media environment, even though they were found to be related to knowledge sharing and help seeking in prior research (e.g., Treem & Leonardi, 2012). One possible explanation is that these individualized affordances only indirectly influence students' regulation of social media environment in the voluntary context. For example, post-editability and searchability are possible actions related to editing and finding content afforded by social media, which can be the root affordances of manageability, i.e., the possible actions related to organize, control, and categorize users and information. In other words, manageability is possible because of the post-editability and searchability affordances. Therefore, post-editability and searchability may influence students' engagement in regulation of social media environment via the mediation of manageability.

Among the shared affordances, interactivity was the only shared affordances that exerted significant influences on regulation of learning. Similarly, prior research also found that the main motivation for students to use social media for learning was the possibility to interact with other users (Mao, 2014). Findings of this study further suggest that the interactivity afforded by social media is related to how students set their learning goals, finding the productive learning environment, controlling the learning performance, and evaluating the learning outcomes. For the non-significant associations between other shared affordances (i.e., communication visibility, group association, and network scalability) and regulation of learning, they may be attributed to the mediation effect of interactivity affordance. It is possible that it is the higher level of communication visibility, group association, and network scalability that foster a higher degree of interactivity affordance perceived by students, which could influence the extent of regulation of learning.

In addition, group association was the only shared affordances that was significantly associated with regulation of social media environment. As suggested in prior research (Metzger et al., 2010), learning in a community was a social method to get high-quality information and credible resources. Group association in social media has also been suggested as a main channel for support exchange among people with the same learning interest (Burke et al., 2008). Further, as there are distractions from group discussions, students may also manage the notifications or control the information flow in a group to avoid distraction. However, there were non-significant relationships between other shared affordances and regulation of social media use. Although prior research (e.g., Treem & Leonardi, 2012) on organizational communication suggested the influences of shared affordances on people's strategic behaviors of using social media, those studies are mainly qualitative interpretation of the relationships between affordances and various behavioral outcomes. Future research may build on the investigation in this study to further verify the relationships between shared affordances and social media usage behaviors.

5.4.3 The Effects of Using SRL Strategies on Learning Satisfaction

The results suggest that regulation of learning and regulation of social media environment significantly predicts learning satisfaction when students voluntarily use social media for formal learning. In particular, regulation of social media use was found to be more influential than regulation of learning to predict learning satisfaction with social media in the voluntary context, which extends the findings in Study 1.

The relationship between regulation of learning and learning satisfaction has already been revealed in Study 1 and prior online learning studies. For example, Tabuenca et al. (2015) found that students with clear goals of learning with mobile devices were more likely to gain learning satisfaction when goals were accomplished. In addition, the importance of an environment that can be conducive to learning was also found in Wu (2015), which suggested that when learning in an environment with too many distractions irrelevant to course learning, students would fail to maintain focused attention on learning, which in turn affect their satisfaction with the learning

experience. Moreover, in the process of learning, the more performance control strategies (i.e., task strategies, time management and help seeking) the students use, the more likely they will perceive the enjoyment of acquiring knowledge and solving problems (Kuo et al., 2014). Further, learning satisfaction may also emerge from the evaluation of what one has achieved. For example, one way of self-evaluation of learning in social media is through comparison with other online learners (Dabbagh & Kitsantas, 2011). The findings of this study suggest that social media afford interactivity, which can facilitate connections and communications with online learning communities. Such evaluation may motivate students to enhance the desired learning outcome and achieve satisfactory learning experience.

As suggested by this study, regulation of social media environment can exert more influence on students' learning satisfaction with social media in the voluntary context. This finding further highlights the important role of regulation of social media environment in the voluntary learning contexts. Scholars in education have stressed that without a good management of the autonomy when learning with social media, students would fail to maintain focused attention on learning, which in turn affect their satisfaction with the learning experience (e.g., Wu, 2015). In addition, social media provide student knowledge out of the classroom. Students who employ information evaluation strategies will be more likely to acquire high-quality learning resources, which can contribute to a more satisfactory learning experience. Moreover, support exchange with other users in social media can facilitate students' engagement in social learning. As found in prior research, the social presence of other peer learners can positively influence student satisfaction with online distance learning (Artino, 2007; Ke, 2010). It is therefore reasonable that using support exchange strategies is also important in achieving satisfactory learning experience in social media.

The results of this study reveal that the extent to which students engage in regulation of learning and regulation of social media environment is positively associated with their learning satisfaction in social media. In this light, it is crucial to understand what influences students' learning satisfaction in social media. A satisfactory learning experience is important as it may exert influence on people's

overall evaluation of their learning effectiveness and continuous motivation to voluntarily use social media for learning. Regarding this, the findings of this study provide evidence that using SRL strategies can be a significant predictor of students' learning satisfaction in the context of voluntary use of social media for formal learning.

Moreover, the analysis of the model revealed that the use of SRL strategies mediated the effects of personal factors and social media affordances on learning satisfaction. Specifically, personal factors of self-efficacy and intrinsic goal orientation, and the social media affordance of interactivity influence learning satisfaction indirectly through regulation of learning; personal factors of task value, social media self-efficacy, and attitude, and the social media affordances of manageability and group association influence learning satisfaction indirectly through regulation of social media environment. The mediation findings suggest that personal factors and social media affordances encourage students to formulate and engage in SRL strategies when using social media voluntarily for formal learning, and these SRL behaviors, in turn, plays a pivotal role in gaining satisfactory learning experience with social media. As there are lack of external regulation and guidance for learning from course instructors in the voluntary context, it is important for students to strategically regulate the social media learning process as well as social media environment, which are critical factors ultimately influencing the learning satisfaction.

5.5 Summary

An integrated model of using SRL strategies, including ten hypotheses, was developed in Study 3 to investigate the influences of personal factors and environmental factors on using SRL strategies, as well as the effects of using SRL strategies on learning satisfaction. The SEM results suggested that the integrated model was empirically validated.

Concerning the regulation of learning, the results indicated that two personal factors related to learning, i.e., self-efficacy for learning and intrinsic goal, were the

significant personal factors that influence the regulation of learning; the shared social media affordances of interactivity was the only environmental factor that influences the regulation of learning.

Regarding the regulation of social media environment, one of the personal factors related to learning, i.e., task value, two personal factors related to social media use, i.e., social media self-efficacy and attitude towards using social media for learning, one individualized social media affordance, i.e., manageability, and one shared social media affordance, i.e., group association, were found to be the influential factors.

Both categories of using SRL strategies, i.e., regulation of learning and regulation of social media use, were positively related to learning satisfaction with social media in the voluntary context. The use of SRL strategies also mediated the effects of personal factors and social media affordances on learning satisfaction. Implications of findings in Study 3 for research and practice will be elaborated in Chapter 6.

CHAPTER SIX CONCLUSION

This chapter concludes this dissertation by summarizing the main findings of the three studies. It also discusses how these findings can provide implications for research and practice. Finally, limitations of the current project and recommendations for future research are presented in the final section.

6.1 Summary of the Research Findings

The usefulness of social media for teaching and learning in formal education has been well documented (e.g., Greenhow & Lewin, 2016; Huang, 2018; Zhou, Lee, & Sin, 2017). Integrating social media in formal education is deemed as important for preparing students for lifelong learning (Greenhow & Lewin, 2016). Recent work has suggested that students also voluntarily use various social media platforms to supplement their educational endeavor. With easy access to interactions with other users and knowledge shared by other users, the phenomenon of voluntary use of social media for formal learning appears to be a significant part of the educational landscape (Manca & Ranierit, 2016).

Even though it is natural for students to voluntarily leverage multiple social media to supplement and complement their formal learning, there are concerns regarding whether students can well-manage their learning with social media due to the high degree of learning autonomy required when learning with social media, especially in the voluntary context. When voluntarily using social media to supplement formal learning, learning activities are initiated and led by the students, and the selection and adoption of social media are decided by the students (Manca & Ranieri, 2016). Given the complexity and high autonomy of the learning context, it is necessary for a student to actively appropriate SRL strategies to manage learning with social media to achieve satisfactory learning outcomes (Dabbagh & Kitsantas, 2012; Matzat & Vrieling, 2015).

Informed by the research problem, the goal of this dissertation is to shed light on the extent that students use SRL strategies to manage their learning when

voluntarily using social media for formal learning, as well as the influential factors and effects of such behaviors. To achieve this research goal, this research draws on the perspective of social cognitive theory, supplemented by the literature on technology affordances. The social cognitive theory guides the overall theoretical framework of this study, which posits that both personal factors and the environment can affect behavior, and the behavior can in turn affect personal perceptions (Bandura, 1986). The affordances approach supplements the social cognitive perspective by informing social media affordances as potential environmental factors in the dynamic self-constructed learning environment in which students adopt and adapt multiple technologies voluntarily to support their formal learning. Informed by this theoretical framework, the entire PhD study is guided by the following research questions:

RQ 1: What are the SRL strategies that students use when voluntarily using social media to support formal learning?

RQ 2: What are the personal factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning?

RQ 3: What are the environmental factors that influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning?

RQ 4: What are the effects of SRL strategies on learning satisfaction when students voluntarily using social media to support formal learning?

To address the research questions and achieve the research goal, three interrelated studies were carried out in sequence. Firstly, Study 1 (Chapter 3) was conducted to partially address RQ 1, RQ 2, and RQ 4. After identifying the SRL strategies, personal factors, learning satisfaction, and their relationships in social cognitive theory and related research on online learning and technology use, Study 1 examined the relationships between two categories of personal factors, the use of specific SRL strategies, and learning satisfaction in the context of voluntary use of social media for formal learning. Next, Study 2 (Chapter 4) further extended Study 1 to explore other possible SRL strategies and to explore social media affordances

as potential environmental factors that may also influence the use of SRL strategies, thus addressing RQ 1 and RQ 3. Lastly, building on the findings of Study 1 and Study 2, Study 3 (Chapter 5) addressed all RQs by proposing and testing an integrated model that explicates the relationships among personal factors, social media affordances, the use of SRL strategies, and learning satisfaction in the context of voluntary use of social media for formal learning. The findings are summarized as below.

In terms of RQ 1, which is posed to examine the SRL strategies that students use when voluntarily using social media to support formal learning, the three studies have identified two categories of SRL strategies: regulation of learning and regulation of social media environment. Regulation of learning includes strategies such as goal setting, environment structuring, performance control, and self-evaluation; and regulation of social media environment includes three other strategies, i.e., information evaluation, support exchange, and distraction management. In particular, Study 1 tested whether the SRL strategies uncovered in prior research were also used by students when they voluntarily use social media for formal learning. Based on the review of literature that studied online learning, the SRL strategies examined in Study 1 are goal setting, environment structuring, task strategies, time management, help seeking, and self-evaluation. Study 1 found that three of the six SRL strategies, i.e., task strategies, time management, and help seeking, were loaded together and thus combined as one variable as *performance control*. That is, there are four SRL strategies employed by students when voluntarily using social media for formal learning in school, which are goal setting, environment structuring, performance control, and self-evaluation. Next, Study 2 employed focus group research to explore whether there were other SRL strategies that students used when voluntarily using social media for formal learning. Study 2 found that in addition to the four strategies identified in Study 1, i.e., goal setting, environment structuring, performance control, and self-evaluation, there are three other strategies, i.e., information evaluation, support exchange, and distraction management, used by the students to manage their learning with social media in the voluntary context. In particular, these strategies can be classified into two categories of SRL strategies:

regulation of learning and regulation of social media use. These two categories of SRL strategies were further validated in Study 3.

With regard to RQ 2, i.e., what personal factors can influence the extent to which students use SRL strategies when voluntarily using social media to support formal learning, there were two categories of personal factors found to exert influence on the extent to which student use SRL strategies, including personal factors related to learning and personal factors related to social media use. In particular, Study 1 tested whether two categories of personal factors identified in prior research were related to the extent to which students use SRL strategies. In terms of personal factors related to learning on the specific SRL strategies, self-efficacy for learning is positively associated with the use of SRL strategies of environment structuring; intrinsic goal orientation is positively associated with the use of SRL strategies of goal setting and performance control; and task value is negatively related to using performance control strategies. In terms of personal factors related to social media use, social media self-efficacy was found to be positively associated with the use of SRL strategies of goal setting, performance control, and self-evaluation; learning outcome expectations for social media appeared to be an influential factor explaining the people's use of SRL strategies of environment structuring, performance control, and self-evaluation; and attitude toward using social media for learning was positively associated with the use of all four SRL strategies, i.e., goal setting, environment structuring, performance control, and self-evaluation. Further, Study 3 examined how the personal factors (as identified in Study 1) could influence students' use of two categories of SRL strategies (i.e., regulation of learning and regulation of social media environment). In terms of the influential factors that were related to regulation of learning, two personal factors related to learning, i.e., self-efficacy for learning and intrinsic goal, and two personal factors, i.e., self-efficacy and intrinsic goal orientation, were found to influence the extent to which students engage in regulation of learning. With regard to regulation of social media environment, it was found that three personal factors, i.e. task value, social media self-efficacy, and attitude toward using social

media for learning, could significantly influence the extent to which students engage in regulation of social media environment.

Regarding RQ 3, which is posed to explore the environmental factors that influence the extent to which students use SRL strategies when voluntarily using social media for formal learning, there are two categories of affordances uncovered in Study 2 as the environmental factors: individualized affordances and shared affordances. Five affordances, including editability, manageability, modality, persistence, and searchability, were grouped into the category of individualized social media affordances, which are about possible actions that involve only one user to enact when using social media. The other five affordances were grouped into the category of shared social media affordances, including association, immediacy, interactivity, scalability, and visibility, which are actions that involve at least two users to perceive and enact. These identified affordances encompass the major resources offered by social media for learning perceived by students in the voluntary context. The findings of Study 2 provide an initial list of SRL strategies and social media affordances. Next, Study 3 examined how the two categories of environmental factors (i.e., individualized social media affordances and shared social media affordances) could influence students' use of two categories of SRL strategies (i.e., regulation of learning and regulation of social media environment). It was found that the shared affordance of interactivity was the only environmental factor that could influence the regulation of learning, and two environmental factors, i.e. social media affordances of manageability and group association, could significantly influence the extent to which students engage in regulation of social media environment.

Finally, RQ 4, which is proposed to examine the effects of SRL strategies on learning satisfaction when students voluntarily using social media to support formal learning, Study 1 and Study 3 validated the positive effects of using SRL strategies on learning satisfaction. In particular, Study 1 found that the use of four SRL strategies of regulation of learning were all positively associated with the learning satisfaction in social media. The findings of Study 1 suggest that the incorporation of personal factors related to social media use into the personal factors can contribute to more explanatory power of using SRL strategies. Put differently, in a learning

context mediated by social media, the extent to which student engage in SRL strategy can be influenced not only by personal factors related to learning, but also by personal factors related to social media use. As Study 2 revealed that students also employed the other category of strategies, i.e., regulation of social media environment, Study 3 further investigated the significant influences of these two category of strategies, i.e., regulation of learning and regulation of social media environment on learning, on learning satisfaction with social media and identified the positive influences of using the two categories of SRL strategies on learning satisfaction. Through model testing, Study 3 also revealed that the use of SRL strategies mediated the effects of personal factors and social media affordances on learning satisfaction.

In light of the findings in the present study, six conference papers have been published or presented:

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6.2 Implications

The findings of this study can yield important implications for future research and practice in the fields of social media use in education, as elaborated in the following sections.

6.2.1 Implications for Research

This study can make several contributions to research.

First, an interesting point of this study is the finding of the two dimensions of SRL strategies that are important in the context of voluntary use of social media for formal learning. This is the first study that explores SRL in the voluntary context, to the best of knowledge. In particular, two categories of SRL strategies were identified, i.e., regulation of learning and regulation of social media environment, which students use when voluntarily using social media for formal learning. The findings of the two dimensions of SRL strategies used to manage learning with technologies have extended prior research that only examined SRL strategies related to regulation of learning, such as goal setting, environment structuring, performance control, and self-evaluation, which are common in the online course learning contexts (e.g., Artino, 2007; Barnard, 2009; You & Kang, 2014). The attention on regulation of learning is due presumably to the fact that prior online learning research (e.g., Kuo et al., 2013) mainly investigated the use of learning technologies that are specifically designed and used for formal educational purposes, thus the students' use of

technology for learning is structurally directed by the course design. Whereas the use of social media can also be guided by instructors when they are used in a mandatory manner (e.g., Dabbagh & Kitsantas, 2012), students in the voluntary context have more autonomy and control over their learning process, as well as social media use, such as selection and use of social media platforms, instruments, materials, and online human resources. In this vein, this study suggests that the new category of SRL strategies, i.e., strategies related to regulation of social media environment, are also important. These include information evaluation, support exchange, and distraction management when using social media for learning in the voluntary context. The new category of SRL strategies was also found to exert more influences on students' learning satisfaction with social media in the voluntary context, compared to SRL strategies related to regulation of learning. As learning and social media use in the voluntary context are not guided and regulated by the instructor, students need to self-regulate in both the learning process and social media environment to gain satisfactory learning experience. In this vein, the findings of two categories of SRL strategies provide empirical evidence for extending theories of SRL in the social media learning context. The identified SRL strategies and their relationships with learning satisfaction can help explicate the mechanism underlying SRL with social media in the voluntary context.

Second, this study extends research that draws personal factors from the social cognitive theory to understand learning with social media. As suggested by Tsai et al. (2011), much research on online learning has only examined either personal factors related to learning, such as self-efficacy of academic learning, or personal factors related to technology use, such as Internet self-efficacy, and their associations with students' learning processes and learning outcomes. The findings of this study imply that in a learning context mediated by social media, SRL strategy use can be influenced not only by personal factors related to learning, but also by personal factors related to social media use, that is, people's beliefs of using social media for learning. Results from Study 1 suggests that the incorporation of the personal factors related to social media use improved the explanatory power of personal factors on using SRL strategies. Study 3 reveals the direct effects of personal factors related to

social media use, in terms of social media self-efficacy and attitude, on the regulation of social media use. The findings of the influences of personal factors related to social media use also provide additional empirical support for social cognitive research by highlighting that personal factors related to technology use can also influence people's learning behavior with technologies, especially in the voluntary context. Undoubtedly, technologies have made significant impacts on our life and education and new technologies like social media have provided students with voluntary options to engage in learning beyond the classroom (Greenhow & Lewin, 2016). Future research can build on findings of this study to examine how the two-dimension personal factors may influence the extent to which students engage in SRL strategies when voluntarily use other new technologies, such as virtual reality and artificial intelligent applications, for learning purposes.

Third, this study also extends social cognitive theory by supplementing the affordances approach as the environmental factors to explain the use of SRL strategies in the voluntary context of using social media for formal learning. Specifically, instead of focusing on any particular feature or platform, an affordance view on social media use provides a theoretical perspective to understand the students' awareness of the learning environment that is constructed by the students themselves via various social media (Rice et al., 2017; Völjätaga et al., 2011). The identification of two main categories of affordances, i.e., individualized and shared affordances, provides an important foundation for future research to evaluate how social media and other technologies are used by the students for learning purposes, and the outcomes of these affordances. The identification of individualized social media affordances (i.e., manageability, post-editability, and searchability) and shared social media affordances (i.e., communication visibility, group association, interactivity, and network scalability) through Study 2 and Study 3 suggests some affordances are conceptually and empirically distinct as perceived by the students in the voluntary context. In addition, the survey instrument for social media affordances and regulation of social media environment, which was developed from the qualitative research (Study 2) and verified in the quantitative research (Study 3). The framework of measurements developed in this research can provide references for

future researchers to examine other outcomes that can be associated with these social media affordances. The findings about the influences of social media affordances on using SRL strategies also suggests that affordances are differently associated with the students' regulation behaviors. For example, it is found that the shared affordance of interactivity is significantly associated with regulation of learning, while the individualized affordance of manageability is significantly associated with regulation of social media environment. These findings present empirical evidence of how social media affordances can be associated with behavioral outcomes, such as using SRL strategies, which extends the social cognitive theory to explain the relationships between a technological environment and human behavior.

6.2.2 Implications for Practice

The findings of this study also reveal practical insights about the ways of enhancing learning experience when using social media for formal education as well as for lifelong learning.

First, at the individual learner level, the findings of this study highlight the critical role of using SRL strategies for students who engage in learning with social media. This research suggests that to gain learning satisfaction, students need to be competent to self-regulate both their learning (i.e., the learning process) and the social media environment (i.e., the learning platform). In other words, for students who want to gain more learning satisfaction when voluntarily utilizing social media for learning, they need to become a self-regulated learner not only by setting learning goals, finding a conducive learning environment, employing task strategies, and evaluating if the goals have been achieved, but also by evaluating the learning resources in social media, exchanging support, and managing distractions from social activities. Moreover, the findings of this study imply that the extent of their use of SRL strategies depends on the personal factors such as self-efficacy and intrinsic goal orientation, as well as the environmental factors such as social media affordances of manageability and interactivity. These findings provide ways for students to improve their SRL skills when learning with social media in the voluntary context. The findings of this study suggest that social media learners should be aware

of their inner motivational beliefs and the resources offered by social media, thus enhancing the capacity to manage learning with social media effectively to gain desired learning outcomes

Second, at the educational institutional level, instructors and policymakers in higher educational institutions need to integrate relevant SRL in their pedagogical design. Specifically, one important finding from this work is that students are supplementing their formal learning with diverse social media platforms on their own. While this is unsurprising, as suggested in this study and prior research (e.g., Manca & Ranieri, 2016), students already know how to use social media and it is natural for them to use familiar tools to support their formal learning. It should be noted that students are navigating diverse learning resources from a wide array of social media platforms ranging from Facebook to WhatsApp without much guidance and instruction. To ensure effective learning and foster students' engagement in self-regulation, it is recommended that when integrating social media into the design of a course, fewer restrictions should be given to students in terms of the selection of social media, thus providing more voluntary options for students to take control of their own learning. In addition, to prepare students to become self-regulated learners, there is a need to provide students with knowledge of self-regulated learning and the opportunities to practice using SRL strategies. For example, students should also be taught skills to discern falsehoods/misinformation from accurate information, which is important for learning quality (Chen, Sin, & Lee, 2015). In this vein, training programs that teach social media use and practical learning strategies are needed in formal education to guide students to be aware of the useful learning resources in multiple social media tools and be capable of managing their learning with social media effectively.

Third, for practitioners in the online education industry (e.g., CodeAcademy, Coursera), the findings of this study may provide implications for them about the design and promotion of online course products. Many online learning platforms, such as MOOCs, have embedded social media platforms (e.g. Twitter) to enhance collaboration, interactivity, and learning satisfaction (Shen & Kuo, 2015). However, users may view social media technologies or features in a particular social media in

different ways to meet their learning goals, which may be unintended by the online course designers. For example, designers may integrate social networking tools (e.g., Facebook) in an online learning platform because they can afford association and interactivity, while a student with the intention to collect and organize course-related information in social networking tools may perceive the affordances of searchability and manageability. It is thus important for the designers to understand how online learners perceive the affordances of social media for learning purposes. In this light, this study has identified two categories of prominent social media affordances perceived by students when they use social media voluntarily for learning: the individualized affordance and the shared affordance. The individualized affordances include editability, manageability, modality, persistence, and searchability, while the shared social media affordances include association, immediacy, interactivity, scalability, and visibility. These identified affordances encompass the major resources offered by social media that are perceived by students as useful for learning in the voluntary context. Accordingly, designers of online learning platform can refer to these affordances identified to design online learning platforms and online course activities. In terms of self-regulated learning, this study also suggests that some social media affordances, such as manageability, interactivity, and group association can be important environmental factors that influence student's SRL behaviors when learning with social media. These findings can guide the online learning designers to choose which features or which type of social media can be helpful to facilitate students' SRL when integrating these social media into their own online learning platforms. For example, to promote interactivity, which has an impact on students' regulation of learning, online learning platforms can integrate WhatsApp or other social media with interacting features to facilitate immediate interaction among students. To verify whether a student actually perceives and uses social media features in a similar way as the designer intended, future research can analyze secondary data collected from the backend to analyze a student's actual online behaviors. A post-test survey using the questionnaires designed in this study can also be conducted to explore whether and to what extent students perceive the affordances of social media or features that are integrated into an online learning platform by the

designers. Qualitative studies such as interviews and focus groups can also help to explore why students vary in the extent of their perceptions.

Last, this study has implications for fostering a culture of lifelong learning in society. In many countries (e.g., Singapore), lifelong learning is regarded as a crucial means for the nation to remain competitive (Bhunia, 2018). Governments in these countries advocate the constant acquisition of new knowledge and skills so that its citizens are able to meet the fast-changing needs of the job market. Regarding this, social media provide available and accessible updated knowledge and expanded learning networks, which can be useful resources for lifelong learning (Lander & Stever, 2018). Hence, the findings of this study suggest the critical role of using SRL strategies in a self-paced learning environment in terms of enhancing leaning experience and promoting continuous learning. This research also revealed several specific factors (e.g., self-efficacy for learning, intrinsic goal orientation, interactivity affordances of social media) that are significant in influencing learner's engagement in self-regulation for learning. These findings can be applied in public projects by governments to provide lifelong learning instructions that aim to cultivate the skills and mindsets for lifelong learning in society.

6.3 Limitations

The data gathered, while fitting for the purpose of this research, warrant caution when interpreted outside the scope of the original study designs.

First of the limitations is that only self-reported data used in the three studies when investigating the behaviors of using SRL strategies. Although self-reported measurement is deemed as the most direct measure to an underlying construct in behavior science, it is ideal to use a multiple-method measurement approach to gain a more accurate measurement of human behaviors (Gravetter, 2012). For example, the construct of “using SRL strategies” can reveal itself as overt behaviors, which can be observed and measured. In this vein, behavioral data can also be used as indicators of the strategies that learners use when voluntarily using social media for formal learning. For instance, a profile of a student's social media group settings and

notification settings can serve as an additional measure of a student's actual engagement in regulation of social media environment. Nevertheless, this study has integrated both quantitative (i.e., surveys) and qualitative (i.e., focus group discussions) research method to gain in breadth and depth of understanding the SRL behaviors use of strategies. The measurement scales were also validated through statistical analysis. Regarding this, future research can build on this study to explore other possible modalities of measurement. The other limitation of the self-report survey is the possibility that respondents may distort the measures (Gravetter, 2012). For example, whether respondents really answered the questionnaire based on the voluntary use context could not be validated. Thus, future study can build on the current study and conduct a study in a controlled environment. For example, participants can answer the questionnaire on the basis of a context in which social media use is not mandatory for a course. Moreover, the self-report learning satisfaction can be limited to suggest a student's actual knowledge retention and learning achievement, which make it difficult for students to adjust their learning progress with social media. As academic performance is deemed as an important indicator for both teachers and the students themselves to understand how students are doing with a course (Sobaih et al., 2016), it is suggested that future study can assess the effects of using SRL strategies on learning outcomes including both self-report learning satisfaction and objective course grades. To statistically test the significance of the relationships, future research can measure the academic performance using standardized course grades from a controlled learning environment in which students' use of social media for a particular course is voluntary.

The second limitation is the sampling technique used in this study. Data collection were using convenience sampling at a single university in Singapore. While the focus on a single research site can control for potential varieties in the educational policies in different schools and countries, such control of the research design may limit generalizability. In particular, participants of all three studies were recruited from Nanyang Technological University in Singapore, which is a reputable university requiring high academic standards in admission. It is possible that students

who are more academically competent are more engaged in self-regulation and using social media voluntarily for formal learning. Likewise, non-university students, such as student in secondary schools or vocational schools, may differ from university students in learning behaviors and social media usage. Thus, the relationships between personal factors related to social media use for learning, perceived social media affordances for learning, using SRL strategies and learning experience may be different from those who are not experienced with using social media for learning (Dabbagh & Kitsantas, 2012). In addition, undergraduate and postgraduate students may differ in the SRL strategies they use, as the postgraduate students have got more practice of using of social media for learning purposes. Moreover, it should be noted that most of the participants in the studies were from an engineering background, as almost 42% of students in NTU are from the College of Engineering (Facts & Figures, n.d.). Thus, future research could apply the conceptual model in this study to different educational institutions and different groups of students so that individuals' use of SRL strategies when voluntarily using social media for formal learning in school can be better understood.

Third, the current study aims to examine the use of multiple social media, and findings of this study suggest that students voluntarily use multiple social media for learning. But it also suggests that some types of social media (e.g., social networking sites, wikis, and resource sharing sites) were used more frequently than other social media. For some content-sharing social media, such as Wikipedia and YouTube, this study did not differentiate whether the users are the content contributors (e.g., Wikipedian and Youtuber) or just knowledge consumer. The differences in social media usage may lead to the variances in perceived affordances. For example, for students using Wikipedia as an online encyclopedia for knowledge seeking, they may perceive a higher degree of network scalability but lower degree of interactivity and group association. In contrast, students who are Wikipedians may experience more interactivity and group association. Future research can extend the current study to examine the nuanced differences of social media usage and their effects in the voluntary context.

Another limitation is the cross-sectional design of the current study, which could not suggest the long-term trend of the hypothesized relationships in the model. It is possible that the effects of some influential factors on learners' engagement in SRL strategies in the present study may change with increasing learners' experience of learning with social media over time. For example, a learner's social media self-efficacy can increase with more experience of using social media (Hocevar et al., 2014). In this vein, causal inferences regarding the relationship among the constructs in the model cannot be directly determined. Nevertheless, this study provides an initial step by outlining the relationships between personal factors, social media affordances, using SRL strategies, and learning satisfaction. Future research could ideally conduct panel survey to collect longitudinal data that capture learners' self-regulated learning process over time.

6.4 Recommendations for Future work

Building on the investigation conducted in the present research, future studies are recommended to work on three possible directions: the development of effective technological scaffolding, the examination of other learning outcomes, and the extension and adaptation of the conceptual model.

Firstly, future research can draw on the technological advances in machine learning and artificial intelligence to develop effective technological scaffolds that guide learners to use SRL strategies when learning with social media in the voluntary context. While it is assumed that learners that use social media voluntarily for formal learning are active learners, many students may not know how to learn with social media effectively (Wodzicki et al., 2012). In this vein, machine learning techniques, such as learning analytics, can help optimize and personalize the learning experience by analyzing data about learners and the learning context (Masleno et al., 2018). Based on the findings of this study, a scaffold can be developed as an intervention tool that supports a learner's regulation of learning and regulation of social media environment. For example, by identifying the less self-regulated learners, the recommendation system in the scaffold can provide learners with personalized

learning plans, learning resources, and supportive online learning communities to engage individuals in learning with social media.

In addition, as this study employs social cognitive model as the theoretical framework, the personal factors under investigation were drawn from prior studies that applied social cognitive theory in the context of technology use and online learning. Although this study provides valuable insights of motivational beliefs as the personal factors that influence the extent to which learners use SRL strategies to manage their learning, the potential influences of personal factors from other theoretical perspectives, such as personality (John, Naumann, & Soto, 2008) and learning styles (Reid, 1995), warrant exploration in future research.

Moreover, this study did not control the effect of the frequency of social media use as research has suggested that the frequency of social media use was not directly associated with students' acceptance of using social media like YouTube and Facebook for teaching and learning in higher education (Buzzetto-More, 2014). To examine the factors that have direct effects on students' use of SRL strategies in the context of voluntary use of social media for formal learning, the current study draws on social cognitive theory as the theoretical framework to understand how personal factors and environmental factors can influence students' use of SRL strategies. Personal factors in the social cognitive theory are the motivational beliefs of a learner, including personal factors related to learning and personal factors related to social media use; and environmental factors are the social media affordances in the social media learning environment constructed by students. Nevertheless, other research also suggests that prior experience of using social media could affect the personal factors related to social media use, such as social media self-efficacy (Hocevar et al., 2014), as well as how users perceive the social media affordances (Treem & Leonardi, 2012). In this light, as frequent social media users have more experience of using social media, it is possible that the frequency of social media use may exert an indirect influence on the extent to which a student uses SRL strategies, through the mediation of personal factors and social media affordances. Regarding this, it is worthwhile for future work to take the frequency of social media use into consideration and extend the conceptual model proposed in the present research.

Furthermore, this study only explores using SRL strategies by students in the higher formal education contexts, in line with most existing research on SRL (e.g., Azevedo, 2005; Dabbagh & Kitsantas, 2005; Greene & Azevedo, 2007). Beyond the structured academic environment, studies (e.g., García-Peñalvo et al., 2012; Kind & Evans, 2015) have noted that professionals would also voluntarily employ social media to satisfy their career development needs at work. To meet the fast-changing needs of the job market, learning opportunities are important for working adults to acquire new knowledge and skills, thus upgrading their competencies. Social media can foster continuing professional development by providing easy access to newly updated knowledge and online learning communities (McGowan et al., 2012). In this vein, future research may test the model of this study to understand how working adults engage in SRL strategies when voluntarily using social media for professional development at work.

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Appendix A: IRB Approval (Study 1)

Research Support Office

Reg. No. 200604393R

IRB-2016-02-047

30 March 2016

Associate Professor Lee Chei Sian
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title: Investigating the influence of personal and environmental factors on self-regulated learning in social media

I refer to your application for ethics approval with respect to the above project.

The Board has deliberated on your application and noted from your application that your research involves collecting behavioral data from participants using surveys and questionnaires.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

- a) NTU IRB application form dated **29 February 2016**
- b) Participant information sheet and consent form: version 1 dated **29 February 2016**
- c) Data collection form: version 1 dated **29 February 2016**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **30 March 2016 to 29 March 2017**. The NTU IRB reference number for this study is **IRB-2016-02-047**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. All research involving procedures greater than minimal risk on minors (individuals who are less than the legal age of 21 years old) requires IRB approved written Parental Consent and assent from the participant to be obtained before any research protocols can be administered. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.
2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.

Blk N2.1, B4-01, 76 Nanyang Drive, Singapore 637331 Nanyang Avenue, Singapore 639798
Tel : +65 6791 9857, Fax: 6793 2019
www.ntu.edu.sg

Research Support Office

3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.
4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.
5. The Principal Investigator should report promptly to NTU IRB regarding:
 - a. Deviation from, or changes to the protocol.
 - b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
 - c. All serious adverse events (SAEs) which are both serious and unexpected.
 - d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
 - e. Completion of the study.
6. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
 - a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
 - b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.
7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.

A handwritten signature in black ink, appearing to read "Lee Sing Kong".

Professor Lee Sing Kong,
Chair, NTU Institutional Review Board
encl.

cc Chair, Wee Kim Wee School of Communication and Information
Members, NTU Institutional Review Board

Research Integrity and Ethics Office

3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.
4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.
5. The Principal Investigator should report promptly to NTU IRB regarding:
 - a. Deviation from, or changes to the protocol.
 - b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
 - c. All serious adverse events (SAEs) which are both serious and unexpected.
 - d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
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 - b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.
7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.

A handwritten signature in black ink, appearing to read "Lionel Lee".

Professor Lionel Lee
Chair, NTU Institutional Review Board
encl.

cc Members, NTU Institutional Review Board

Appendix B: Questionnaire (Study 1)

Survey on Learning Behavior in Social Media

Dear Participant,

I am a research student from the Wee Kim Wee School of Communication and Information, Nanyang Technological University. This survey aims to examine how personal and environmental factors influence people's learning behavior when using social media. The purpose and requirement of this survey are explained in the consent form. After you agree to participate in this study, you will be asked to **reflect on your experience of using social media for learning** and answer related questions in the questionnaire.

Your input is valuable and would be greatly appreciated as **every response is vital to the success of this study**. Please be assured that the information you provide will be used solely for academic research purposes and kept **strictly confidential**. Feel free to approach me if you have any problems.

Your time and participation in completing this survey will be highly appreciated! Thank you very much for your contributions to research!

Yours sincerely,

Zhou Quan

Consent Form

Title of Project: Investigating the influence of personal and environmental factors on self-regulated learning in social media

Principle investigator:

Dr. LEE Chei Sian
WKWSCI, Nanyang Technological University, Singapore

Co-investigators:

Dr. Joanna SIN Sei Ching
WKWSCI, Nanyang Technological University, Singapore
ZHOU Quan
WKWSCI, Nanyang Technological University, Singapore

Requirement:

You must be 18 years or older and must have the experience of using social media for learning.

Purpose of the research:

The aim of this study is to examine how personal and environmental factors influence people's learning behavior when using social media.

What you will do in this study:

During this study you may be asked to:
respond to a 20-30 minutes survey.
complete a brief demographics questionnaire.
recall an experience of using social media for learning.
rate a series of statements on the extent to which you agree or disagree.

Risks:

There are no anticipated risks, beyond those encountered in daily life, associated with participating in this study.

Benefits:

There are no direct benefits to you for participating in the study. Through participating in this research, you may benefit from contemplating how social media technologies have supported your learning for coursework or job training.

Voluntary Withdrawal:

Participation is voluntary and anonymous and you may withdraw from participation at any time. You may skip over any questions or procedures that you do not wish to answer. You may also withdraw by closing your browser window or returning the unfinished questionnaire to the researcher. Your decision to participate, decline, or withdraw participation will have no effect on your status.

Confidentiality:

There is no need to provide your name or identification information. Your participation in this study will remain confidential. All data you have provided will be kept strictly confidential. Results of this study may be presented at conferences and/or published in books, journals, and/or other media.

Further information:

If you have any problems concerning the study in the future, please email ZHOU Quan [zhou0245@e.ntu.edu.sg].

Who to contact about your rights in this study:

If you have any enquirers concerning the study in the future, please feel free to contact Nanyang Technological University Institutional Review Board. Email: **irb@ntu.edu.sg**
Phone: 65922495

Thank you for considering participating in this study. Your participation will provide us invaluable insights. Please let us know if you have any questions about the survey.

I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I understand that I am free to withdraw at any time without incurring any penalty.

I agree to participate in this study.

Name of Participant (optional) _____

Date _____

Section A: Demographic Information

Firstly, please tell us some information about yourself. All data will be kept **STRICTLY CONFIDENTIAL**.

A1. Gender: ☐ Men ☐ Women
A2. Age: _____
A3. What is the highest level of education you have completed? ☐ Elementary/High school ☐ Junior College/Polytechnic ☐ Bachelor's Degree ☐ Master's Degree ☐ Doctorate Degree
A4. What is the academic degree you are currently working toward? ☐ Junior College/Polytechnic ☐ Bachelor's Degree ☐ Master's Degree ☐ Doctorate Degree ☐ Not working for a degree
A5. What is your educational background? ☐ Computer science/IT ☐ Engineering ☐ Arts, humanities, social sciences ☐ Business ☐ Hospitality/tourism ☐ Medicine ☐ Architecture, environment ☐ Education ☐ Advertising, design and media ☐ Life/health sciences ☐ Sports and leisure ☐ Others (Please specify) _____
A6. Which sector does your work belong to? ☐ Not employed ☐ Research/Education ☐ IT ☐ Banking/Finance/Insurance/Marketing ☐ Manufacturing ☐ Chemical/Medicine ☐ Construction/Building ☐ Hospitality/Tourism ☐ Telecommunications ☐ Media and advertising ☐ Food & Beverages ☐ Government ☐ Others (Please specify) _____
A7. What is your profession? ☐ Student ☐ Production ☐ Office and Administrative Support ☐ Management ☐ Legal ☐ Education, Training, and Library ☐ Business and Financial ☐ Computer and Mathematical ☐ Sales ☐ Engineering and Architecture ☐ Transportation and Logistic ☐ Others (Please specify) _____

Section B: Social Media Usage

Please indicate your experience of social media usage.

1 Very infrequently (less than once a month or never)	2 Rarely (a few times a month)	3 Sometimes (a few times a week)	4 Often (a few times a day)	5 Very frequently (more than 5 times a day)
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B1. In general, how often do you use each type of the following social media?

Social Network Sites (e.g., Facebook, LinkedIn, Academia. edu)	1	2	3	4	5
Blogging (e.g., Blogger)	1	2	3	4	5
Microblogging (e.g., Twitter, Weibo)	1	2	3	4	5
Multimedia Sharing (e.g., YouTube, Instagram, Slideshare)	1	2	3	4	5
Wikis (e.g., Wikipedia)	1	2	3	4	5
Social bookmarking (e.g., Delicious)	1	2	3	4	5
Virtual communities (e.g., Quora, Reddit, Github)	1	2	3	4	5
Video Teleconferencing (e.g., Skype)	1	2	3	4	5
Text Chat (e.g. WhatsApp, LINE, WeChat)	1	2	3	4	5
Web-based (cloud-computing) office tools (e.g., Google Doc, Calendar sharing)	1	2	3	4	5
Others (Please specify) _____	1	2	3	4	5

Now you will be asked to specify an experience of using social media for learning.

Description: People are using social media to support and facilitate their learning. For example, to support formal learning in school or workplace, instructors may design learning activities in social media (e.g., online discussion groups) as a part of course learning or job training. Even when it is not compulsory, some people may also use social media to facilitate their learning for their course study or job training (e.g., watching YouTube tutorial videos).

Here, please recall the most recent course in school or job training in workplace in which you use social media to support your study.

(NOTE: The course of training you will select should be the one in which the **learning outcomes are assessed** in the forms like assignments or tests.)

B2 Please specify the context of this learning experience.

- ☐ I was using social media to support my study for a course in school.
- ☐ I was using social media for a job training related to my work.

B3 Please briefly describe the subject of the course/training.

B4 What is the format of the course/training?

- ☐ The instruction of the course/training takes place in both the online and traditional face-to-face learning environments.
- ☐ The course /training is a wholly online course format without face-to-face instruction and interaction.

B5 How long does the course/training last?

- ☐ Less than 1 week
- ☐ 1 week-1 month
- ☐ 1-3months
- ☐ More than 3 months

B6 What social media tools did you use for the course/training you selected? If it is adopted, please indicate whether the use is voluntary or compulsory.

(NOTE: You can choose both when you use two tools in the same category with different voluntariness. For example, if the use of Facebook is compulsory in the course but your use of Linkedin for the course learning is voluntary), then you can choose both “voluntary” and “compulsory” in the same category.)

	Not use	Voluntary	Compulsory
Social Network Sites (e.g., Facebook, Linkedin, Academia. edu)			
Blogging (e.g., Blogger)			
Microblogging (e.g., Twitter, Weibo)			
Multimedia Sharing (e.g., YouTube, Instagram, Slideshare)			
Wikis (e.g., Wikipedia)			
Social bookmarking (e.g., Delicious)			
Virtual communities (e.g., Quora, Reddit, Github)			
Video Teleconferencing (e.g., Skype)			
Text Chat (e.g. WhatsApp, LINE, WeChat)			
Web-based (cloud-computing) office tools (e.g., Google Doc, Calendar sharing)			
Others (Please specify) _____			

B7 How often did you engage in the following learning activities in social media for the course/training you selected?

1 Very infrequently (less than once a month or never)	2 Rarely (a few times a month)	3 Sometimes (a few times a week)	4 Often (a few times a day)	5 Very frequently (more than 5 times a day)
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Networking with other users	1	2	3	4	5
Searching learning materials	1	2	3	4	5
Learning from the materials (e.g., videos, audios, text, graph)	1	2	3	4	5

Posting reflective content	1	2	3	4	5
Posting questions	1	2	3	4	5
Making comments	1	2	3	4	5
Answering other's questions	1	2	3	4	5
Recording journals	1	2	3	4	5
Sharing learning materials	1	2	3	4	5
Social editing	1	2	3	4	5
Others (Please specify) _____	1	2	3	4	5

B8. For the course/training you selected, how often do you use any of the following devices for learning in social media?

Desktop computer	1	2	3	4	5
Laptop computer	1	2	3	4	5
Mobile devices (e.g., smart phone, tablet)	1	2	3	4	5
Others (Please specify) _____	1	2	3	4	5

Please indicate to what extent do you agree with the following statements about this course/training.

1 – strongly disagree	2 – disagree	3 – neutral	4 – agree	5 – strongly agree
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B9 I liked the subject matter of this course/training.	1	2	3	4	5
B10 I will be able to use what I learned in this course/training for future use.	1	2	3	4	5
B11 It was important for me to learn well in this course/training.	1	2	3	4	5
B12 In the long run, I will be able to use what I learned in this course/training.	1	2	3	4	5
B13 I was very interested in the content of this course/training.	1	2	3	4	5
B14 It was important for me to do well in this course/training.	1	2	3	4	5
B15. Even in the face of learning difficulties related to this course/training, I was certain I could overcome it in the process of learning.	1	2	3	4	5
B16. I was confident I could do an outstanding job on all the learning tasks related to this course/training in social media.	1	2	3	4	5
B17. I was confident I could facilitate my learning of this course/training by myself without the physical presence of an instructor to assist me.	1	2	3	4	5
B18. I was certain I could understand the most difficult material presented in social media that was related to this course/training.	1	2	3	4	5

To what extent do you agree with the following statements about your learning motivations of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree	
B19. I used social media for this course/training because I preferred some materials that really challenged me so I could learn new things.	1	2	3	4	5
B20. I learned in social media because I preferred materials that aroused my curiosity, even if it was difficult to learn.	1	2	3	4	5
B21. The most satisfying thing for me when learning in social media for this course/training was trying to understand the learning materials as thoroughly as possible.	1	2	3	4	5
B22. I enjoyed acquiring useful knowledge or skills related to the course/training in social media, even if there was no reward (e.g., a good grade, credit, or a diploma) or approval from others.	1	2	3	4	5
B23. The opportunity to learn new things about this course/training in social media was important to me.	1	2	3	4	5
B24. I was trying hard to improve my learning by using social media.	1	2	3	4	5
B25. The opportunity to extend the range of my ability and knowledge about this course/training in social media is important to me.	1	2	3	4	5
B26. When learning in social media, I prefer to learn things I expect to do well, rather than things that I expect to do poorly.	1	2	3	4	5
B27. When learning in social media, the learning experience I enjoy the most is the one from which I get the desirable reward (e.g., a good grade, credit, or a diploma).	1	2	3	4	5
B28. When learning in social media, the learning experience I enjoy the most is the one from which I get approval from others.	1	2	3	4	5
B29. When I use social media for learning, the opinions others have about how well I can do certain things are important to me.	1	2	3	4	5
B30. Even if I knew that I did a good job on my learning in social media, I would be satisfied only if others recognize my accomplishment.	1	2	3	4	5
B31. Even if I knew that I did a good job on my learning in social media, I would be satisfied only if I am rewarded.	1	2	3	4	5

ATTENTION: Please answer all the following questions based on THE course/training you selected in which you used social media to support the learning.

Section C: Learning Behavior

To what extent do you agree with the following statements about your behavior when using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree	
C1. I set standards for my learning in social media.	1	2	3	4	5
C2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the learning session) when I used social media for learning.	1	2	3	4	5
C3. I kept a high standard for my learning in social media.	1	2	3	4	5
C4. I set goals to help me manage study time when learning in social media.	1	2	3	4	5
C5. I didn't compromise the quality of my learning because it was in social media.	1	2	3	4	5
C6. When I was using social media for learning, I chose a place where I could avoid too much distraction.	1	2	3	4	5
C7. When I was using social media for learning, I would find a comfortable place to study.	1	2	3	4	5
C8. When I was using social media for learning, I knew where I could study most efficiently.	1	2	3	4	5
C9. When I was using social media for learning, I chose a time with few distractions.	1	2	3	4	5
C10. I tried to take more thorough notes when I was learning in social media because notes are even more important for learning in social media than in face-to-face learning.	1	2	3	4	5
C11. I read aloud the learning materials in social media to fight against distractions.	1	2	3	4	5
C12. I prepared my questions and thoughts when joining in an online discussion.	1	2	3	4	5
C13. I used social media to work on extra problems of my course/training to master the content.	1	2	3	4	5
C14. I allocated extra studying time for my learning in social media because I knew it would be time-demanding.	1	2	3	4	5
C15. I tried to schedule the same time every day or every week to study in social media, and I observed the schedule.	1	2	3	4	5
C16. Although the time to use social media for my learning was flexible, I still tried to distribute my studying time evenly across days.	1	2	3	4	5
C17. I connected with or follow someone who I thought knowledgeable in social media so that I could consult with him or her when I need help.	1	2	3	4	5
C18. I shared my study problems in social media so that I could figure out what I was struggling with and how to solve my problems.	1	2	3	4	5

C19. When needed, I tried to communicate with other learners in a synchronous way in the form of face-to-face or through video conferencing or text chat.	1	2	3	4	5
C20. I was persistent in getting help from other peer learners or experts or instructors through social media tools.	1	2	3	4	5
C21. I summarized what I have learned in social media to examine my understanding.	1	2	3	4	5
C22. I asked myself a lot of questions when learning about the materials in social media.	1	2	3	4	5
C23. I compared with peer learners to find out how well I am using social media to support my study for the course/training.	1	2	3	4	5
C24. I compared with peer learners to find out the difference between my learning in social media and theirs.	1	2	3	4	5

Section D: Personal Factors

To what extent do you agree with the following statements about your perception of your capability of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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D1. I could use a new social media tool for learning even if I had never used it before.	1	2	3	4	5
D2. I could use a new social media tool for learning even if there is no one around to tell me what to do as I go.	1	2	3	4	5
D3. I could use a new social media tool for learning if I could ask someone for help when I got stuck.	1	2	3	4	5
D4. I could use a new social media tool for learning if I had seen someone else using it before trying it myself.	1	2	3	4	5
D5. When I was learning in social media, I was confident that I could access appropriate support from other users.	1	2	3	4	5
D6. When I was using social media for learning, I was confident that I could get information needed for this course/training.	1	2	3	4	5
D7. When I was using social media to support my learning of this course/training, I could perform well on the learning activities in social media.	1	2	3	4	5

To what extent do you agree with the following statements about your expectations of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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D8. Using social media would help me to acquire conceptual knowledge.	1	2	3	4	5
D9. Using social media would help me to acquire technology-related skills for learning.	1	2	3	4	5
D10. Using social media would help me to acquire skills regarding how to manage my learning.	1	2	3	4	5

D11. Using social media would give me flexibility in my learning pace.	1	2	3	4	5
D12. Using social media would enable me to get easy and fast exchange of information and knowledge with peer learners.	1	2	3	4	5
D13. Using social media would enable me to connect and communicate with knowledgeable users.	1	2	3	4	5
D14. Using social media would help me to apply my knowledge to solve different problems.	1	2	3	4	5
D15. Using social media will help me to acquire skills of communication and cooperation.	1	2	3	4	5

To what extent do you agree with the following statements about your attitude towards using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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D16. I like using social media for learning.	1	2	3	4	5
D17. I look forward to learning tasks that require me to use social media.	1	2	3	4	5
D18. Using social media for learning will be frustrating for me.	1	2	3	4	5
D19. I will get bored quickly when using social media for learning.	1	2	3	4	5

Section E: Social Media Environment

To what extent do you agree with the following statements about your perception of learning with other users in social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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E1. Even though other users and I were not physically together in social media, I still felt like I was part of them.	1	2	3	4	5
E2. Learning in social media provides a personal experience similar to face-to-face learning.	1	2	3	4	5
E3. Learning in social media allows for social interaction.	1	2	3	4	5
E4. Learning in social media allows me to express my feelings, and to learn the feelings of others.	1	2	3	4	5
E5. Learning in social media provides a reliable means of communication.	1	2	3	4	5
E6. Social media is an efficient means of communicating with others.	1	2	3	4	5
E7. I felt I got to know a great deal about other peer learners in social media.	1	2	3	4	5
E8. I felt I got to know a great deal about some knowledgeable users/experts/instructors in social media.	1	2	3	4	5

To what extent do you agree with the following statements about your experience of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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Compared to face-to-face learning,

E9. ... learning in social media increases the amount of interaction with other learners.	1	2	3	4	5
E10. ...learning in social media increases the quality of interaction with other learners.	1	2	3	4	5
E11. ...learning in social media increases the amount of interaction with course instructors or experts or knowledgeable users.	1	2	3	4	5
E12. ...learning in social media increases the quality of interaction with online course instructors or experts or knowledgeable users.	1	2	3	4	5

When using social media to support my learning in the course/training I selected,

E13 ...I was free to choose what I want to learn	1	2	3	4	5
E14 ...I was free to choose when and where to learn.	1	2	3	4	5
E15 ...I was free to ask questions.	1	2	3	4	5
E16 ...I was free to express how I would like to do things.	1	2	3	4	5
E17 ...I was free to express how I see things before being suggested any new ways to do things.	1	2	3	4	5
E18 ...I was free to choose the knowledge users from whom I want to learn.	1	2	3	4	5
E19 ...I was free to choose the peer learners with whom I want to learn.	1	2	3	4	5

Section F: Evaluation of Social Media Learning Experience

Please indicate your summarize of your experience of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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F1. I enjoyed my use of social media for this course/training.	1	2	3	4	5
F2. I am satisfied with my learning experience of using social media.	1	2	3	4	5
F3. I had fun using social media for learning.	1	2	3	4	5
F4. I felt that “time flies” when I am using social media for learning.	1	2	3	4	5
F5. Overall, social media has met my learning expectations.	1	2	3	4	5
F6. My choice to use social media for learning was a wise one.	1	2	3	4	5

F7. The learning experience in social media stimulated my desire to learn.	1	2	3	4	5
F8. The learning experience in social media made me want to continue my learning.	1	2	3	4	5
F9. The learning experience in social media inspired me to learn more about the subject of the course/training.	1	2	3	4	5
F10. By using social media for this course/training, I have acquired knowledge and skills I need.	1	2	3	4	5
F11. By using social media for this course/training, I have improved personal competence in effective learning.	1	2	3	4	5
F12. By using social media for this course/training, I have improved my skills in using social media technologies to support learning.	1	2	3	4	5
F13. By using social media for this course/training, I have solved the learning problems I had.	1	2	3	4	5

Please indicate your continuance intention of using social media for learning after your experience of using social media for the course/training you selected.

1– strongly disagree	2 – disagree	3 – neutral	4 – agree	5– strongly agree
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F14. I intend to continue to use social media for learning in the future.	1	2	3	4	5
F15. I will continue to use social media for learning as much as possible.	1	2	3	4	5
F16. I will recommend that my friends/classmates/colleagues utilize social media to support their learning.	1	2	3	4	5
F17. Social media will be an autonomous learning tool for me.	1	2	3	4	5

**You have reached the end of the survey.
Thank you very much for your time and participation! 😊**

Appendix C: IRB Approval (Study 2)

Research Integrity and Ethics Office

Reg. No. 200804393R

IRB-2017-03-047

25 April 2017

Associate Professor Lee Chei Sian
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title: Investigating the Influence of Social Media on Self-Regulated Learning in the Formal Learning Context

I refer to your application for ethics approval with respect to the above project.

The Board has considered your application and noted from your application that your research involves collecting behavioral data from participants through focus group discussion and surveys.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

- a) NTU IRB application form dated **12 April 2017**
- b) Participant information sheet and consent form: version 1 dated **12 April 2017**
- c) Data collection form: version 1 dated **12 April 2017**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **25 April 2017** to **24 April 2018**. The NTU IRB reference number for this study is **IRB-2017-03-047**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. All research involving procedures greater than minimal risk on minors (individuals who are less than the legal age of 21 years old) requires IRB approved written Parental Consent and assent from the participant to be obtained before any research protocols can be administered. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.
2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.

50 Nanyang Avenue, North Spine, NS4-05-92A, Singapore 639798
Tel: (65) 6592-2495
www.ntu.edu.sg

Research Integrity and Ethics Office

3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.
4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.
5. The Principal Investigator should report promptly to NTU IRB regarding:
 - a. Deviation from, or changes to the protocol.
 - b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
 - c. All serious adverse events (SAEs) which are both serious and unexpected.
 - d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
 - e. Completion of the study.
6. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
 - a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
 - b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.
7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.

A handwritten signature in black ink, appearing to read 'Lionel'.

Professor Lionel Lee
Chair, NTU Institutional Review Board
encl.

cc Members, NTU Institutional Review Board

Appendix D: Focus Group Guide for Moderator (Study 2)

Focus Group Guide for Moderator

Pre-session

When participants arrive and register, the research assistant will hand out consent forms to participants to obtain their signed consent and provide them with blank nametags.

Introduction

Good afternoon/evening. Welcome to today's focus group session. My name is _____ from Wee Kim Wee School of Communication and Information of Nanyang Technological University, and I am the moderator for this discussion. My job is to move the conversation along and to make sure that we cover several different subjects and to ensure that everyone here gets involved. The purpose of our discussion is to find out about your use of social media for course learning in school. I am glad that you are taking time out of your day to talk with us about a range of important topics related to social media use for learning. There are no right or wrong answers to any of the questions I will pose, and I encourage you to speak freely.

Respect for opinions

In fact, you may find that you disagree with an opinion voiced here by another person. That is OK, and I hope you will say so when that happens in a respectful and polite way. You also may change your mind in the middle of our discussion, perhaps as a result of something that someone else says, and again I hope you will say so, if and when that happens.

Important rule: One person speaking at one time

Because we want to respect everyone and make sure that everyone is heard, we have one basic rule in this session – we will allow only one person to speak at a time. We want to have an organized session, and in order to do this, I ask that you respect the person who is speaking, and wait for him/her to finish his/her thoughts.

Confidential/anonymous research

When introducing yourselves, you can pick a fictitious name, and use it throughout the session. As indicated in the consent form, our discussion will be audio-recorded because we do not want to miss anything important you may share later, which will be very important for our data collection. I also do not have to take notes while we talk and I can concentrate on you and on our discussion. Please

take note that none of your responses will be identified with you in either the transcript or the final research publications. Your participation is voluntary and you can opt out at any time you want. Also, if you want to have your comments expunged from the material, we will respect that wish. If you have questions about your rights as a study participant, or are dissatisfied with any aspect of this study, you may contact Nanyang Technological University's Institutional Review Board at (+65) 6592-2495 or irb@ntu.edu.sg. You may do so anonymously if you wish.

Opening Question

1. Let us start with an introduction. Please tell us how we can call you in this discussion, the year of your study, and your major.

Introductory Question

Social media use for formal learning

2. We are here to talk about social media use for coursework in school. The social media we discuss here are social media tools that are publically accessible for general use, such as Facebook, Twitter, YouTube, etc. Now please think about the courses you have taken in the past few semesters in NTU. You may write down two courses that you used social media most frequently. Please also write down the social media used during the courses. The use of these social media can be asked by your instructors as part of the course, and also can be initiated by yourselves. (Participants write down their answers on their note paper. Wait for two minutes.) OK. Now tell us about the courses you have chosen. What social media did you use during these courses and how?
3. How do you think these social media helped you in your coursework? What do you like or dislike about the use of social media for your coursework?
4. While social media have been used for our course study in school, we are also using other institutional learning management systems, such as Blackboard adopted in NTU.

How do you think the use of social media is different from the use of traditional learning management systems?

LISTEN FOR

Learner control

Networking

Resources

Persistence

Other

PROBE IF NECESSARY

Key Questions

As some of you have mentioned, more and more course instructors are using social media in their course design and teaching. In this case, students are asked to use some social media tools to accomplish the learning tasks. This is termed as mandatory use. On the other hand, because various social media are accessible and available in our daily life, students can also voluntarily make use of social media tools in their study. This is termed as voluntary use.

Self-regulated learning strategies

5. Assuming that you are voluntarily using social media for a course, what could be your learning purposes of using social media?

Please share your past experiences, as well as your thoughts about voluntarily using social media for coursework.

LISTEN FOR

To deepen learning (e.g., by searching online for course-related concepts, examples, or demonstrations)

To accomplish group projects

To support course-related activities

To solve course-related problems

To expand course-related knowledge

To connect with classmates

Other

PROBE IF NECESSARY

6. Assuming that you are voluntarily using social media for a course, how would you manage your time of using social media for learning and for other online activities?

Please share your past experiences, as well as your thoughts about voluntarily using social media for coursework.

LISTEN FOR

Time planning
Self-monitoring
Other

PROBE IF NECESSARY

7. Assuming that you are voluntarily using social media for a course, what strategies would you use to help you remember and understand the important learning materials you get in social media?

Please share your past experiences, as well as your thoughts about voluntarily using social media for coursework.

LISTEN FOR

Notes taking
Archiving
Online discussion
Help seeking
Self-evaluation

PROBE IF NECESSARY

8. (For some students, they may have difficulty focusing on learning in social media because there are other interesting things that they would rather do, such as surfing websites, checking emails, refreshing for feeds updates, and chatting with friends.) What strategies would you use to make yourself focus on the learning activities in social media? In other words, how would you manage the distractions when you are using social media for learning?

Please share your past experiences, as well as your thoughts about voluntarily using social media for coursework.

LISTEN FOR

Physical environment structuring
Online environment structuring
Other

PROBE IF NECESSARY

9. Would you use any other strategies to manage your learning when you would voluntarily use social media for a course?

Please share your past experiences, as well as your thoughts about voluntarily using social media for coursework.

Social media use

Here is a list of social media that are commonly used in our day-to-day practice. We will discuss about the features of each social media regarding how you can take advantage of these features to support your learning when using the social media voluntarily for your course study in school?

(HAND OUT THE DISCUSSION GUIDE INCLUDING THE FOLLOWING ITEMS. DISCUSS ONE BY ONE)

10. How do you think you can use the features of **Social Networking Sites (e.g., Facebook, LinkedIn, Academia.edu, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Feeds updating
- Notifications
- Save
- Share
- Comment
- Like
- Friending (Find friend, friend request)
- Groups
- Recommendations
- Personal profile
- Post (status, blogging, etc.)
- Tag
- Message
- Check-in
- Events
- Notes
- Any other features?

11. How do you think you can use the features of **Blogging Sites (e.g., Blogger, WordPress, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Blog post
- Personal profile
- Comment
- Subscribe
- Categorize
- Any other features?

12. How do you think you can use the features of **Microblogging Sites (e.g., Twitter, Tumblr, Weibo, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Feeds updating
- Search
- Post/Tweets (text, photo, video, audio, etc.)
- Tag
- Hashtag
- Reply
- Retweet
- Share
- Like
- Follow
- List
- Subscribe to a list;
- Message
- Trends
- Recommend
- Notifications
- Any other features?

13. How do you think you can use the features of **Resource Sharing Sites (e.g., YouTube, Podcasts, Slideshare...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Subscribe
- Feeds updating
- Search
- Category
- Recommendation
- Rewinding/Fast-forwarding
- Video/Audio/Slides create
- Watching history
- Add to watch later
- Save to personal library/repository
- Statistics of views
- Like/dislike
- Comment
- Share
- Download (if possible)
- Any other features?

14. How do you think you can use the features of Photo Sharing Sites (e.g., Instagram, Flickr, ...) to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Post pictures/short videos
- Locations
- Tag other users
- Hashtag
- Feeds updating
- Follow
- System suggestions
- Search (photos, people, or group)
- Discussion group (e.g., Flickr)
- Discover/Explore
- Comment
- Notifications
- Share
- Message
- Save
- Personal profile
- Any other features?

15. How do you think you can use the features of **Wikis (e.g., Wikipedia, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Search
- Link (wikilink, interwiki link, web link)
- Contribute
- Edit
- Personal profile
- Any other features?

16. How do you think you can use the features of **Social Bookmarking Sites (e.g., Delicious, Pinterest ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Bookmark
- Tag;
- Personal library
- Annotate
- Highlight
- Notes taking
- Edit
- Outline

- Groups
- Archived web pages
- Any other features?

17. How do you think you can use the features of **Online Community Sites (e.g., Reddit, Github, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Search
- Post/Submit/Thread
- Comment
- Share
- Save
- Subscribe
- Filter
- Category (e.g., subreddits)
- Moderator
- Admin
- Hide
- Any other features?

18. How do you think you can use the features of **Social Q&A Sites (e.g., Quora, Yahoo!Answer, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience and knowledge of using social media for learning.

- Ask questions
- Search (questions, topic, people, ...)
- Filtering
- Answer questions
- Comment
- Edit (questions, answers, ...)
- Upvote/Downvote
- Share
- Save
- Go anonymous
- Notifications
- Related questions recommendation
- Follow (question, people, topic, blog, ...)
- User profile
- Message
- Any other features?

19. How do you think you can use the features of **Video Chatting Tools (e.g., Skype, Google Talk, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Calling
- Video calling
- Group calling
- Messaging (text; voice; video)
- Sharing (files; image; videos)
- Translator
- Any other features?

20. How do you think you can use the features of **Instant Messaging Tools (e.g., WhatsApp, LINE, QQ, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Message
- Call
- Sharing (files, image, videos, location)
- Starred messages
- Groups
- Save
- Mute
- Notification
- Any other features?

21. How do you think you can use the features of **Web-based (Cloud-computing) Collaborating Tools (e.g., Google Office, Calendar Sharing, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience and knowledge of using social media for learning.

- Save in the cloud
- Share
- Edit with others in real-time
- Chat and comments
- Personal archive
- Any other features?

22. Other Social Media Platforms (PROBE IF NECESSARY)

Ending Question

23. Our discussion today was intended to help us understand social media use for coursework in school. Is there anything else you would like to add to what we have discussed?

Closing Remarks

Thank you. We have come to the end of today's focus group discussion. Your inputs have been invaluable. They will help teachers and other students make good use of social media for learning. If you have questions about the discussion or your participation, please let me know. You can also email our investigator Zhou Quan at zhou0245@e.ntu.edu.sg. Please turn to our research assistant to collect the cash reward of S\$20 as our token of appreciation for your time.

Appendix E: Discussion Guide for Participants

(Study 2)

Discussion Guide for Participants

Here is a list of social media that are commonly used in our day-to-day practice.

We will discuss about the features of each social media regarding how you can take advantage of these features to support your learning when using the social media voluntarily for your course study in school?

(DISCUSS ONE BY ONE)

1. How do you think you can use the features of **Social Networking Sites (e.g., Facebook, LinkedIn, Academia.edu, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.
 - Feeds updating
 - Notifications
 - Save
 - Share
 - Comment
 - Like

- Friending (Find friend, friend request)
- Groups
- Recommendations
- Personal profile
- Post (status, blogging, etc.)
- Tag
- Message
- Check-in
- Events
- Notes
- Any other features?

2. How do you think you can use the features of **Blogging Sites (e.g., Blogger, WordPress, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Blog post
- Personal profile
- Comment
- Subscribe
- Categorize
- Any other features?

3. How do you think you can use the features of **Microblogging Sites (e.g., Twitter, Tumblr, Weibo, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Feeds updating
- Search
- Post/Tweets (text, photo, video, audio, etc.)
- Tag
- Hashtag
- Reply
- Retweet
- Share
- Like
- Follow
- List
- Subscribe to a list;
- Message
- Trends
- Recommend
- Notifications
- Any other features?

4. How do you think you can use the features of **Resource Sharing Sites (e.g., YouTube, Podcasts, Slideshare...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Subscribe
- Feeds updating
- Search
- Category
- Recommendation
- Rewinding/Fast-forwarding
- Video/Audio/Slides create
- Watching history
- Add to watch later
- Save to personal library/repository
- Statistics of views
- Like/dislike
- Comment
- Share
- Download (if possible)
- Any other features?

5. How do you think you can use the features of **Photo Sharing Sites** (e.g., Instagram, Flickr, ...) to help you with your learning for a course in school?

Please contribute your insights based on your experience or knowledge of using social media for learning.

- Post pictures/short videos
- Locations
- Tag other users
- Hashtag
- Feeds updating
- Follow
- System suggestions
- Search (photos, people, or group)
- Discussion group (e.g., Flickr)
- Discover/Explore
- Comment
- Notifications
- Share
- Message
- Save
- Personal profile
- Any other features?

6. How do you think you can use the features of **Wikis (e.g., Wikipedia, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience or knowledge of using social media for learning.

- Search
- Link (wikilink, interwiki link, web link)
- Contribute
- Edit
- Personal profile
- Any other features?

7. How do you think you can use the features of **Social Bookmarking Sites (e.g., Delicious, Pinterest ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Bookmark
- Tag;
- Personal library
- Annotate
- Highlight
- Notes taking
- Edit
- Outline
- Groups
- Archived web pages
- Any other features?

8. How do you think you can use the features of **Online Community Sites (e.g., Reddit, Github, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Search
- Post/Submit/Thread
- Comment
- Share
- Save
- Subscribe
- Filter
- Category (e.g., subreddits)
- Moderator
- Admin
- Hide
- Any other features?

9. How do you think you can use the features of **Social Q&A Sites (e.g., Quora, Yahoo!Answer, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Ask questions
- Search (questions, topic, people, ...)
- Filtering
- Answer questions
- Comment
- Edit (questions, answers, ...)
- Upvote/Downvote
- Share
- Save
- Go anonymous
- Notifications
- Related questions recommendation
- Follow (question, people, topic, blog, ...)
- User profile
- Message
- Any other features?

10. How do you think you can use the features of **Video Chatting Tools (e.g., Skype, Google Talk, ...)** to help you with your learning for a course in school?
Please contribute your insights based on your experience or knowledge of using social media for learning.

- Calling
- Video calling
- Group calling
- Messaging (text; voice; video)
- Sharing (files; image; videos)
- Translator
- Any other features?

11. How do you think you can use the features of **Instant Messaging Tools (e.g., WhatsApp, LINE, QQ, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience or knowledge of using social media for learning.

- Message
- Call
- Sharing (files, image, videos, location)
- Starred messages
- Groups
- Save
- Mute
- Notification
- Any other features?

12. How do you think you can use the features of **Web-based (Cloud-computing) Collaborating Tools (e.g., Google Office, Calendar Sharing, ...)** to help you with your learning for a course in school?

Please contribute your insights based on your experience or knowledge of using social media for learning.

- Save in the cloud
- Share
- Edit with others in real-time
- Chat and comments
- Personal archive
- Any other features?

13. Other Social Media Platforms?

Appendix F: IRB Approval (Study 3)

IRB-2018-04-029

15 May 2018

Associate Professor Lee Chei Sian
Wee Kim Wee School of Communication and Information

NTU INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title: Self-regulated learning in the context of voluntarily using social media for formal learning

I refer to your application for ethics approval with respect to the above project.

The Board has considered your application and noted from your application that your research involves collecting behavioral data from participants through survey.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The documents reviewed are:

- a) NTU IRB application form dated **26 April 2018**
- b) Participant information sheet and consent form: version 1 dated **26 April 2018**
- c) Data collection form: version 1 dated **26 April 2018**

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under **Expedited** review. The approval period is from **15 May 2018 to 14 May 2019**. The NTU IRB reference number for this study is **IRB-2018-04-029**. Please use this reference number for all future correspondence.

The following protocol and compliances are to be observed upon NTU IRB approval

1. Any research involving subjects less than 21 years old would require IRB approved written Parental Consent and consent from the participant before any research protocols can be administered unless waiver of consent is given by IRB. Minimal risk refers to an anticipated level of harm and discomfort that is no greater than that ordinarily encountered in daily life, or during the performance of routine educational, physical, or psychological examination.
2. Only the approved Participants Information Sheet and Consent Form should be used. It must be signed by each subject prior to initiation of any protocol procedures. In addition, each subject should be given a copy of the signed consent form.
3. Consent forms are important documents therefore they should be stored in the strictest arrangement. Loss of consent form would result in disciplinary action.
4. No deviation from, or changes of, the protocol should be initiated without prior written NTU IRB approval of an appropriate amendment.

Research Integrity and Ethics Office, NTU Institutional Review Board

50 Nanyang Avenue, NS4-05-92A, Singapore 639798, T: (65) 6592-2495, www.ntu.edu.sg

5. The Principal Investigator should report promptly to NTU IRB regarding:
 - a. Deviation from, or changes to the protocol.
 - b. Changes increasing the risk to the subjects and/or affecting significantly the conduct of the trial
 - c. All serious adverse events (SAEs) which are both serious and unexpected.
 - d. New information that may affect adversely the safety of the subjects of the conduct of the trial.
 - e. Completion of the study.
6. Continuing Review Request/ Notice of Study completion form should be submitted to NTU IRB for the following:
 - a. Annual review: Status of the study should be reported to the NTU IRB at least annually using the Continuing Review Request/ Notice of Study completion form.
 - b. Study completion or termination: Continuing Review Request/ Notice of Study completion form is to be submitted within 4 to 6 weeks of study completion or termination.
7. All Principal Investigators should comply with existing legislation that would have an impact on the domain of their research.
8. Advertisements/ Notices for recruitment of subjects must meet the following requirements:
 - a. Advertisements must clearly state that volunteers are being recruited to participate in an NTU research project with proper research title and NTU logo.
 - b. Name and contact details of Principal Investigator (usually a faculty member), and NTU-IRB contact details (Tel: 6592 2495; Email: IRB@ntu.edu.sg) should be provided.
 - c. The NTU-IRB project reference number should be stated.
 - d. Advertisements should include eligibility criteria.
 - e. Advertisements recruiting Minors must explicitly state that parental consent is required for participation (unless NTU-IRB has granted approval for a waiver of parental consent).

Advertisements/ Notices should NOT contain the following:

 - a. State or imply a certainty of favourable outcome or other benefits beyond what is outlined in the informed consent form and the application/protocol.
 - b. Make claims, either explicitly or implicitly, that a procedure or intervention is safe or effective or superior to other standard procedures or interventions.
 - c. Use catchy words like "free" or "exciting."
 - d. Advertisements may state that participants will be paid, but should not emphasize the payment or the amount to be paid (e.g. by such means of larger or bold type)

Professor Lionel Lee
Chair, NTU Institutional Review Board
encl.

Appendix G: Questionnaire (Study 3)

Survey on Learning with Social Media

Dear Participant,

The purpose of this research is to investigate your learning behaviors when voluntarily using social media for course study in school, as well as the influential factors and effects. Please refer to the consent form for more details.

After you agree to participate in this study, you will be asked to reflect on your experience of voluntarily using social media for course study and answer related questions in the questionnaire.

Your input is valuable and would be greatly appreciated as every response is vital to the success of this study. Please be assured that the information you provide will be used solely for academic research purposes and kept strictly confidential.

Thank you for your time and participation! As a token of appreciation, you will get S\$5 cash after completing the questionnaire.

Feel free to approach me via zhou0245@e.ntu.edu.sg if you have any problems.

Yours sincerely,
Zhou Quan

Research Title: Self-regulated learning in the context of voluntarily using social media for formal learning

Principal Investigator: Assoc Prof Lee Chei Sian (Email: leecs@ntu.edu.sg)

NTU-IRB reference number: XXXXXX

NTU-IRB Tel: 6592 2495 Email: irb@ntu.edu.sg

Wee Kim Wee School of Communication and Information, Nanyang Technological University

Section A: Social Media Use

A1. How often do you use each type of the following social media?

0 Never	1 Very infrequently (less than once a month or never)	2 Rarely (a few times a month)	3 Sometimes (a few times a week)	4 Often (a few times a day)	5 Very frequently (more than 5 times a day)
--------------------------	---	--	--	---	---

Social Networking Sites (e.g., Facebook, LinkedIn, Academia.edu, ...)	0	1	2	3	4	5
Blogging (e.g., Blogger, WordPress, ...)	0	1	2	3	4	5
Microblogging (e.g., Twitter, Tumblr, Weibo, ...)	0	1	2	3	4	5
Resource Sharing Sites (e.g., YouTube, Podcasts, SlideShare, ...)	0	1	2	3	4	5
Photo Sharing Sites (e.g., Instagram, Flickr, ...)	0	1	2	3	4	5
Wikis (e.g., Wikipedia, ...)	0	1	2	3	4	5
Social Bookmarking Sites (e.g., Delicious, Pinterest ...)	0	1	2	3	4	5
Online Community Sites (e.g., Reddit, Github, ...)	0	1	2	3	4	5
Social Q&A Sites (e.g., Quora, Yahoo! Answer, ...)	0	1	2	3	4	5
Video Chatting Tools (e.g., Skype, Google Talk, ...)	0	1	2	3	4	5
Instant Messaging Tools (e.g., WhatsApp, LINE, QQ, ...)	0	1	2	3	4	5
Web-based/Cloud-computing Collaborating Tools (e.g., Google Office, Calendar Sharing, ...)	0	1	2	3	4	5
Others (Please specify) _____	0	1	2	3	4	5

A2. Now please think about courses you have taken in the past few semesters in university.

Please write down one course that you used social media most frequently to support your course study. Please note that your use of social media for this course must be **voluntary.**

By voluntary use, we mean the use of social media is not a requirement of the course, but a self-initiated action to support your study for the course.

For example,

The course instructor established a Facebook group and all of us must join to get updates of course-related information and engage in course-related activities. [**Not voluntary use**]

My classmates and I established a Facebook group to discuss course-related information. [**Voluntary use**]

So please indicate **the course** in which you voluntarily used social media **most frequently** to support your study: _____

A3. How often did you voluntarily use these social media for this course?

0 Never	1 Very infrequently (less than once a month or never)	2 Rarely (a few times a month)	3 Sometimes (a few times a week)	4 Often (a few times a day)	5 Very frequently (more than 5 times a day)
--------------------	--	---	---	--	---

Social Networking Sites (e.g., Facebook, LinkedIn, Academia.edu, ...)	0	1	2	3	4	5
Blogging (e.g., Blogger, WordPress, ...)	0	1	2	3	4	5
Microblogging (e.g., Twitter, Tumblr, Weibo, ...)	0	1	2	3	4	5
Resource Sharing Sites (e.g., YouTube, Podcasts, SlideShare, ...)	0	1	2	3	4	5
Photo Sharing Sites (e.g., Instagram, Flickr, ...)	0	1	2	3	4	5
Wikis (e.g., Wikipedia, ...)	0	1	2	3	4	5
Social Bookmarking Sites (e.g., Delicious, Pinterest ...)	0	1	2	3	4	5
Online Community Sites (e.g., Reddit, Github, ...)	0	1	2	3	4	5
Social Q&A Sites (e.g., Quora, Yahoo! Answer, ...)	0	1	2	3	4	5
Video Chatting Tools (e.g., Skype, Google Talk, ...)	0	1	2	3	4	5
Instant Messaging Tools (e.g., WhatsApp, LINE, QQ, ...)	0	1	2	3	4	5
Web-based/Cloud-computing Collaborating Tools (e.g., Google Office, Calendar Sharing, ...)	0	1	2	3	4	5
Others (Please specify) _____	0	1	2	3	4	5

Section B: Evaluations of Learning with Social Media

To what extent do you agree or disagree with the following statements?

1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
--------------------------------	-----------------------	----------------------	--------------------	-----------------------------

When I was voluntarily using social media tool(s) for the course I indicated,						
B1	I was confident I could do an outstanding job on all the learning tasks related to this course in social media.	1	2	3	4	5
B2	I was certain I could understand the most difficult material presented in social media that was related to this course.	1	2	3	4	5
B3	Even in the face of learning difficulties related to this course, I was certain I could overcome it in the process of learning.	1	2	3	4	5
B4	The most satisfying thing for me when learning for this course was trying to understand the learning materials as thoroughly as possible.	1	2	3	4	5
B5	I used social media for this course because I preferred some materials that really challenged me so I could learn new things.	1	2	3	4	5

B6	I enjoyed acquiring useful knowledge or skills related to the course, even if there was no reward (e.g., a good grade, credit, or a diploma) or approval from others.	1	2	3	4	5
B7	I used social media for this course because I preferred materials that aroused my curiosity, even if it was difficult to learn.	1	2	3	4	5
B8	It was important for me to do well in this course.	1	2	3	4	5
B9	I liked the content of this course.	1	2	3	4	5
B10	The content of this course was important for my future development.	1	2	3	4	5
When I was voluntarily using social media tool(s) for the course I indicated, I felt that						
B11	I could use any new social media tools for learning if I had seen someone else using them before trying it myself.	1	2	3	4	5
B12	I could use any new social media tools for learning even if there is no one around to tell me what to do as I go.	1	2	3	4	5
B13	I could use any new social media tools for learning if I could ask someone for help when I got stuck.	1	2	3	4	5
B14	I could use any new social media tools for learning even if I had never used it before.	1	2	3	4	5
B15	I was confident that I could get information needed for this course by using social media.	1	2	3	4	5
B16	using social media would help me acquire conceptual knowledge.	1	2	3	4	5
B17	using social media would help me with my skills regarding how to manage my learning.	1	2	3	4	5
B18	using social media would help me with my technology-related skills for learning.	1	2	3	4	5
B19	using social media would help me apply my knowledge to solve different problems.	1	2	3	4	5
B20	I looked forward to using social media for a learning task.	1	2	3	4	5
B21	I would get bored quickly when using social media for learning.	1	2	3	4	5
B22	using social media for learning would be frustrating for me.	1	2	3	4	5
B23	I liked using social media for learning.	1	2	3	4	5

< ^-----^You have finished 20% of the survey. Please continue to finish! Thanks a lot! ^-----^ >

Section C: Perceptions of Social Media

To what extent do you agree or disagree with the following statements?

1	2	3	4	5		
Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
With the social media tool(s) I used voluntarily for the course I indicated, it was possible for me to ...						
C1	create groups for sharing information related to course study.	1	2	3	4	5
C2	join groups established by others.	1	2	3	4	5

C3	use groups for learning purposes.	1	2	3	4	5
C4	communicate and connect with others through groups.	1	2	3	4	5
C5	follow some experts from my field.	1	2	3	4	5
C6	follow some knowledgeable users and get updates.	1	2	3	4	5
C7	follow some accounts.	1	2	3	4	5
C8	establish direct connections with other users.	1	2	3	4	5
C9	edit before sending out a message, if I made a mistake when creating the message.	1	2	3	4	5
C10	edit the message I wanted to communicate before I actually presented it.	1	2	3	4	5
C11	create a message and delete it before sending out.	1	2	3	4	5
C12	carefully craft my message before sending out.	1	2	3	4	5
C13	edit others' information after they posted it in a collaborative work.	1	2	3	4	5
C14	edit my information after posted it.	1	2	3	4	5
C15	edit my comments and reactions I had made to others.	1	2	3	4	5
C16	edit others' comments and reactions to me.	1	2	3	4	5
C17	get responses from others quickly.	1	2	3	4	5
C18	get feedback very fast.	1	2	3	4	5
C19	get instant feedback.	1	2	3	4	5
C20	receive immediate updates.	1	2	3	4	5
C21	interact with others through chatting, commenting, or other communication.	1	2	3	4	5
C22	interact with others through liking, upvoting or other reactions.	1	2	3	4	5
C23	share my files, photos, other information with others.	1	2	3	4	5
C24	receive files, documents, photos, other information from others.	1	2	3	4	5
C25	retrieve past communication and information.	1	2	3	4	5
C26	save information to read/watch/view later.	1	2	3	4	5
C27	go back and look at information long after the initial communication was done.	1	2	3	4	5
C28	have a record of communication that could last long after the initial communication.	1	2	3	4	5
C29	deliver my messages to public audiences.	1	2	3	4	5
C30	extend my social network.	1	2	3	4	5
C31	find and connect with people I did not know in person.	1	2	3	4	5
C32	find and connect with helpful people I wasn't aware of before.	1	2	3	4	5
With the social media tool(s) I used voluntarily for the course I indicated, it was possible for me to ...						
C33	get new knowledge from the references or recommendations.	1	2	3	4	5
C34	get knowledge from different perspectives.	1	2	3	4	5
C35	extend my knowledge network.	1	2	3	4	5
C36	get useful knowledge I wasn't aware of before.	1	2	3	4	5
C37	search information or people in search engine by keywords.	1	2	3	4	5
C38	search information or people in site maps or online catalogues.	1	2	3	4	5
C39	locate important information easily.	1	2	3	4	5
C40	search for information or people by following links between content.	1	2	3	4	5
C41	turn on/off the notifications.	1	2	3	4	5
C42	adjust the learning speed through forwarding or rewinding.	1	2	3	4	5

C43	manage the lists of friends or groups.	1	2	3	4	5
C44	share information with or block information from certain users or groups.	1	2	3	4	5
C45	acquire knowledge from a single or a combination of different content forms (e.g., text, image, video, audio).	1	2	3	4	5
C46	communicate with others by using a single or a combination of different content forms (e.g., text, image, video, audio).	1	2	3	4	5
C47	deliver my messages by using a single or a combination of different content forms (e.g., text, image, video, audio).	1	2	3	4	5
C48	receive information in a single or a combination of different content forms (e.g., text, image, video, audio).	1	2	3	4	5
C49	present or conceal my identity if I wanted to.	1	2	3	4	5
C50	see the personal profiles of other users.	1	2	3	4	5
C51	see the identity presented or concealed by other users about themselves.	1	2	3	4	5
C52	see the information indicating who a user is.	1	2	3	4	5
C53	see others' new updates or posts.	1	2	3	4	5
C54	see the feedback from other users.	1	2	3	4	5
C55	see communication among other users in comments or group discussions.	1	2	3	4	5
C56	see who had "liked" or "followed" particular users or information.	1	2	3	4	5
C57	see other users' evaluation through the recommendations, liking, or tagging.	1	2	3	4	5

< ^-----^You have finished 70% of the survey. Please continue to finish! Thanks a lot! ^-----^ >

Section D: Learning Behaviors

To what extent do you agree or disagree with the following statements?

1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
------------------------	---------------	--------------	------------	---------------------

When I was voluntarily using social media tool(s) for the course I indicated,						
D1	I set standards for my learning in social media.	1	2	3	4	5
D2	I didn't compromise the quality of my learning because it was in social media.	1	2	3	4	5
D3	I set goals to help me manage study when learning in social media.	1	2	3	4	5
D4	I set goals of what to learn in social media.	1	2	3	4	5
D5	I would find a comfortable place to study.	1	2	3	4	5
D6	I chose a learning space with few distractions.	1	2	3	4	5
D7	I chose a place where I could avoid too many distractions.	1	2	3	4	5
D8	I knew where I could study most efficiently.	1	2	3	4	5
D9	I used social media to work on extra problems of my course to master the content.	1	2	3	4	5

D10	I read aloud the learning materials in social media to fight against distractions.	1	2	3	4	5
D11	I prepared my questions and thoughts when joining in an online discussion in social media.	1	2	3	4	5
D12	I tried to take notes when I was learning in social media because notes are important for learning in social media.	1	2	3	4	5
D13	I connected with or follow someone who I thought knowledgeable in social media so that I could consult with him or her when I need help.	1	2	3	4	5
D14	I allocated extra studying time for my learning in social media because I knew it would be time-demanding.	1	2	3	4	5
D15	I shared my study problems in social media so that I could figure out what I was struggling with and how to solve my problems.	1	2	3	4	5
D16	Although the time to use social media for my learning was flexible, I still tried to distribute my studying time evenly across days.	1	2	3	4	5
D17	I asked myself a lot of questions when learning about the materials in social media.	1	2	3	4	5
D18	I summarized what I learned in social media to examine my understanding.	1	2	3	4	5
D19	I compared with peer learners to find out the difference between my learning in social media and theirs.	1	2	3	4	5

Section E: Social Media Usage Behaviors

To what extent do you agree or disagree with the following statements?

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

When learning with social media for the course I indicated,						
E1	I evaluated if the information in social media was credible or not.	1	2	3	4	5
E2	I checked if the information was contributed by credible users.	1	2	3	4	5
E3	I checked if the information was endorsed by credible users.	1	2	3	4	5
E4	I checked how many other users liked or upvoted the information.	1	2	3	4	5
E5	I got useful information for my course study from other users in social media.	1	2	3	4	5
E6	I got answers to my questions in social media from people I knew in person.	1	2	3	4	5
E7	I got answers to my questions in social media from people I didn't know in person.	1	2	3	4	5
E8	I shared my knowledge to help others in social media to solve their problems.	1	2	3	4	5
E9	I offered answers in social media to questions asked by people I knew in person.	1	2	3	4	5
E10	I offered answers in social media to questions asked by people I didn't know in person.	1	2	3	4	5

E11	I got motivated by stories of other users in social media.	1	2	3	4	5
E12	I got encouragement in social media from people I knew in person.	1	2	3	4	5
E13	I got encouragement in social media from people I didn't know in person.	1	2	3	4	5
E14	I shared my learning experience in social media to motivate others.	1	2	3	4	5
E15	I sent my encouragement in social media to motivate people I knew in person.	1	2	3	4	5
E16	I sent my encouragement in social media to motivate people I didn't know in person.	1	2	3	4	5
E17	I chose social media platforms that matched my learning style.	1	2	3	4	5
E18	I chose social media platforms that were easier for me to learn.	1	2	3	4	5
E19	I chose social media platforms that I felt comfortable to use.	1	2	3	4	5
E20	I chose social media platforms that could facilitate my learning.	1	2	3	4	5
E21	I turned off some notifications to avoid distractions.	1	2	3	4	5
E22	I muted irrelevant social interactions in social media.	1	2	3	4	5
E23	I blocked the distractive influences in social media.	1	2	3	4	5
E24	I avoided being interrupted by irrelevant activities in social media.	1	2	3	4	5
E25	I saved important learning resources in social media so I could use in the future.	1	2	3	4	5
E26	I saved what I have learned so that I could review later.	1	2	3	4	5
E27	I added the useful resources to my personal archive for future review.	1	2	3	4	5
E28	I kept the learning resources archived and retrievable.	1	2	3	4	5

Section F: Learning Experience

To what extent do you agree or disagree with the following statements?

1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
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Regarding my experience of voluntarily using social media for the course I indicated,

F1	I enjoyed my use of social media for this course.	1	2	3	4	5
F2	I had fun learning with social media.	1	2	3	4	5
F3	my learning with social media was a pleasant experience.	1	2	3	4	5
F4	I am pleased with my learning experience of using social media.	1	2	3	4	5
F5	by using social media for this course, I have solved the learning problems I had.	1	2	3	4	5
F6	by using social media for this course, I have acquired knowledge and skills I need.	1	2	3	4	5
F7	the learning experience in social media stimulated my desire to learn.	1	2	3	4	5
F8	overall, social media has met my learning expectations.	1	2	3	4	5

Section G: Demographic Information

Last, please tell us some information about yourself.

All your information will be kept **STRICTLY CONFIDENTIAL**.

G1. Gender: ☐ Men ☐ Women
G2. Age: _____
G3. Which degree are you currently pursuing? ☐ Bachelor ☐ Master ☐ PhD ☐ Others (Please specify) _____
G4. What is your current student status? ☐ Full time student ☐ Part time student
G5. Are you an international student? ☐ Yes, I am an international student / Singapore Permanent Resident (PR). ☐ No, I am a Singaporean student.
G6. What is your academic background? ☐ Accountancy and Business ☐ Arts, Design & Media ☐ Communication Studies ☐ Education ☐ Engineering ☐ Humanities ☐ Medicine ☐ Social Science ☐ Science ☐ Sport Science ☐ Law ☐ Others (Please specify) _____

You have reached the end of the survey.

Thank you very much for your time and participation! ☺

/*-----For paper-based survey-----*/

Please return this questionnaire to our researcher and get the \$5 cash reward.

For any questions, feel free to contact the researcher Zhou Quan via
zhou0245@e.ntu.edu.sg.

/*-----For online survey-----*/

To ensure your anonymity in this survey, please click to the link below to be redirected to the other page to claim the reward.

[REDIRECTED TO THE REWARD PAGE]

Please choose the way you prefer to get the \$5 cash reward:

PayNow transfer service (supported by Citibank Singapore, DBS/POSB, HSBC, Maybank, OCBC, Standard Chartered, UOB, BOC, and ICBC).

Your mobile phone number: _____ or Your Singapore NRIC/FIN: _____

Your name: _____

Self-collect at the researcher Zhou Quan's office @WKWSCI 05-17 in NTU (31 Nanyang Link, Singapore, 637718)

Please leave your email for confirmation : _____

For any questions, feel free to contact the researcher Zhou Quan via zhou0245@e.ntu.edu.sg.