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Zhou, Quan; Lee, Chei Sian; Sin, Joanna Sei - Ching

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Beyond Mandatory Use: Probing the Affordances of Social Media for Formal Learning in the Voluntary Context

Quan Zhou

*Wee Kim Wee School of Communication and Information,
Nanyang Technological University, Singapore
zhou0245@e.ntu.edu.sg*

Sei-Ching Joanna Sin

*Wee Kim Wee School of Communication and Information,
Nanyang Technological University, Singapore
joanna.sin@ntu.edu.sg*

Chei Sian Lee

*Wee Kim Wee School of Communication and Information,
Nanyang Technological University, Singapore
leecs@ntu.edu.sg*

ABSTRACT

The integration of social media in formal education has received consistent interest in the recent decade. While most studies have focused on the mandatory use of social media as pedagogical tools, less explored is the context in which students voluntarily choose and use social media to supplement their formal learning. In this study, we employ an affordance approach to exploring the resources in social media that students perceive and use voluntarily for formal learning. Drawing on a qualitative study using focus groups of university students, we identified ten categories of social media affordances for learning in the voluntary context: association, editability, immediacy, interactivity, manageability, modality, persistence, scalability, searchability, and visibility. The affordances mentioned most frequently by students were visibility, persistence, and interactivity. These identified affordances encompass the major resources offered by social media for learning in the voluntary context, and provide insights into understanding, evaluating, and guiding social media adoption in formal education as well as lifelong learning. This paper concludes by presenting limitations and implications for research and practice.

KEYWORDS

Social media, affordances, voluntary use, formal learning.

INTRODUCTION

With the pervasiveness of social media, the usefulness of social media for teaching and learning in formal education has been widely documented (e.g., Huang, 2018; Zhou, Lee, & Sin, 2017; Greenhow & Lewin, 2015). Instructors in educational institutions have been using open access social media tools, such as Facebook, YouTube, WhatsApp, and Wikis, to enhance teaching (e.g., Jalali, Sherbino, Frank, & Sutherland, 2015; Robertson, 2011; Tess, 2013). The integration of social media in formal education is also deemed to be important for preparing students for lifelong learning (Greenhow & Lewin, 2015). As these new media technologies are not designed specifically for educational purposes, much scholarly attention has been devoted to the problem of how students can make informed choices about various social media and support formal learning with these tools.

Existing studies of social media use for formal learning have mainly focused 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, 2015; Jalali et al., 2015). Specifically, past studies are mostly concerned about the utility and effectiveness of using social media as pedagogical tools (e.g., Huang, 2018; Dabbagh & Kitsantas, 2012) or focus on specialized platforms (e.g. Massive Open Online Courses) that are designed for learning purposes (Ma & Lee, 2018). However, recent work has suggested that students also voluntarily use various generalized social media platforms for their educational purposes. In particular, students select and employ social media to communicate with peer students on course-related information (Manca & Ranierit, 2016), search for learning resources to supplement course materials (Kind & Evans, 2015), and seeking help from expert online users (Greenhow & Lewin, 2015). With easy access to knowledge shared by other users and convenient interactions with other users, the phenomenon of voluntarily using social media for formal learning appears to be a significant part of the educational landscape (Manca & Ranierit, 2016), yet research in this area is still limited.

Further, past studies tend to focus on the use of a particular social media platform. There is a lack of understanding of how and what social media students use in combination given the wide array of social media available for them to choose and use, especially in the voluntary context. For example, students use multiple social media technologies such as Facebook, YouTube, and WhatsApp as part of their formal learning in the voluntary context, albeit with different learning purposes (Greenhow & Lewin, 2015). Less known is how students make sense of available resources offered by various social media and use them appropriately for learning.

To address these issues, we draw from an affordance approach, which 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). The concept of affordances has been used to explicate the use of a set of technologies, including social media, in organizational communication research (e.g., Rice et al., 2017; Treem & Leonardi, 2013; Lee, Watson-Manheim, & Chudoba, 2014) and educational research (e.g., Dabbagh & Kitsantas, 2012; Våljataga, Pata, & Tammets; 2010). In particular, social media affordances refer to resources offered by social media, or the possible actions that social media enable users to achieve their goals (Rice et al., 2017). Instead of focusing centrally on features or a particular social media platform, an affordance lens is helpful in explaining why students use different social media in similar ways or the same social media in different ways (Treem & Leonardi, 2013). That is, exploring affordances can transcend the particularities of any platform or its features. With rapid update and emergence of new social media technologies, awareness of the affordances, coupled with adequate preparation while engaged in formal education, may hold the key for lifelong learners across lifespan (Våljataga et al., 2010).

The aim of this exploratory study is to understand the social media affordances students perceive when they voluntarily use social media for formal learning. Different from the mandatory-use context, the use of social media in the voluntary context can be considered a student-driven, bottom-up approach, where students have more choices over which tools and resources to employ (Greenhow & Lewin, 2015). An affordance approach is pertinent in this inquiry as this concept can shed light on the resources critical for students to achieve their learning goals when they are using social media technologies voluntarily. Taken together, this study attempts to answer the following research question: *What are the social media affordances that students perceive when using social media voluntarily for formal learning?*

LITERATURE REVIEW

Voluntary Use of Social Media for Formal Learning

Formal learning refers to learning that happens in courses or training supported by institutions, resulting in learners receiving grades, degrees, diplomas, and certifications (Dabbagh & Kitsantas, 2012). In the recent decade, as social media have become increasingly ubiquitous among millennium learners, the educational value of integrating these tools in formal education have been highlighted by stakeholders (Greenhow & Lewin, 2015). However, most studies have focused on the mandatory-use context, that is, social media are adopted by course instructors as part of the course design (e.g., Jalali et al., 2015; Robertson, 2011). An important context that is less explored is the voluntary use of social media for formal learning. With the availability of social media for personal usage, the study of the voluntary use of social media by students is an important endeavor (Manca & Ranierit, 2016).

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, 2015). Compared to mandatory use of social media as part of formal course design and requirements, voluntary use of social media empowers students with autonomy and control over their social media selection and usage, as well as learning activities. 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. To be effective social media learners, it is necessary for students to be aware of available resources in social media that are important in the learning process (Våljataga et al., 2010).

Social Media Affordances

To understand the resources and possible actions students perceive when using social media voluntarily for formal learning, we draw on an affordance view. The term “affordances” was defined by Gibson (1986) in the field of ecological psychology as action possibilities for animals in relation to the properties of a given environment. 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 (Rice et al., 2017; Treem & Leonardi, 2013).

Social media affordances have been applied in different areas. In 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. In customer engagement, Cabiddu, Carlo, & Piccoli (2014) identified three distinctive social media affordances: persistent engagement, customized engagement, and triggered engagement. In organizational social media use, Treem and Leonardi (2013) identified four social media affordances: visibility, persistence, editability, and association. Thus, 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. For example, Våljataga et al. (2011) examined college students' perceptions of the affordances of four social media tools (i.e., blog, wiki, aggregator, and social bookmarks) and suggested affordances such as information filtering, assembling the learning environment, community formation and grouping, and self-tutoring. Dabbagh and Kitsantas (2012) developed a pedagogical

framework of social media affordances including personal information management, social interaction and collaboration, and information aggregation and management. 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 (Greenhow & Lewin, 2015). 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 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 their knowledge base, they may perceive the affordance of searchability and scalability. Thus, a comprehensive understanding of how students perceive the affordances of social media for formal learning in the voluntary context is needed.

METHOD

Focus groups were used to collect data to address the research question. 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 different social media to support formal learning in the voluntary context (Morgan, 1998). Prior to participant recruitment and data collection, the research procedures have been approved by the university's Institutional Review Board.

Focus Group Participants

Participants were recruited based on a convenience and purposive sampling from a large university in Singapore. Purposive sampling can facilitate the identification of target participants, who are interested in discussing their experience of voluntarily using social media for formal learning. Informed consents were obtained from all participants at the beginning of each study. A total of 21 students joined three different focus group sessions, ranging from 6 to 8 participants each. Among the participants, there were 12 (57%) male and 9 (43%) female students. It was also identified that 11 (52%) participants were undergraduate students and 10 (48%) participants were postgraduate students. In terms of educational background, there were 12 participants (57%) from engineering, 6 (29%) from social science, 2 (10%) from natural science, and 1 (5%) from humanities and arts.

Data Collection

Each focus group session was moderated by an experienced moderator and a research assistant. The discussion started by asking participants to think about the courses they took in the past few semesters in school and to write down the two courses in which they voluntarily used social media most frequently. Later, participants shared their experience of using social media tools for their course learning. Finally, participants were presented with a discussion guide including a list of popular social media tools (list available from the authors). They were asked to discuss about how the features built in each social media could be used for their formal learning in the voluntary context. Participants were also allowed to bring up any other social media tools that they used voluntarily for formal learning but were not listed in the discussion.

In this process, the moderator was responsible for encouraging all participants to voice opinions and preventing individuals from monopolizing the discussion. In addition, the moderator and assistant used probes, when needed, to continue discussion of a specific question or to keep the focus on the voluntary use of social media for formal learning. 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.

Data Analysis

The coding proceeded through two phases, which followed the two approaches of qualitative content analysis (Lee, 2012). The first phase of data analysis was conducted with the directed content analysis approach where researchers developed the initial coding scheme by identifying variables from prior research. The second data analysis phase used the conventional content analysis where new theoretical categories and insights emerge inductively from data during analysis. Some codes were combined during this process. Thus, combining these two approaches will allow a mix of a priori and emergent coding, leading to a comprehensive understanding of the phenomenon under investigation.

MAXQDA12, a software program for qualitative data analysis, was used to code and to keep track of all the codes in each phase of coding. The first author, who was trained in 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 to support their formal learning 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 the group communication literature (Hirokawa, 1988; Krippendorff, 2004).

Directed content analysis

The first phase of data analysis was designed to use direct content analysis, which focused on using predetermined codes to characterize the types of social media affordances students perceived when voluntarily using social media for formal learning. To create an appropriate coding scheme 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 (table available from the first author). To assess the conceptual validity of these affordances, the conceptual framework of affordances proposed by Evans et al. (2017) was adopted. Specifically, it suggests that three threshold criteria should be considered when assessing a proposed affordance. First, affordances are not features of technologies. Features are built into the technology and do not exist outside the technology, while affordances are possible actions related to the feature. Second, affordances are not the outcomes of using technologies. Third, affordances 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. As in Table 1, these 11 affordances served as predetermined codes in the initial coding scheme.

Affordances	Definitions
Association	Social media enables users to establish and keep connections with other users directionally or in groups, and also establish connections between users with content (Treem & Leonardi, 2013; Gibbs, Rozaidi, & Eisenberg, 2013), also refer to as "connectivity" or "linkage" (Fox & McWan, 2017).
Editability	Social media enable users to craft and recraft a communicative act before it is viewed by others (Walther, 1993), or to modify or revise content they have already been presented or communicated (Rice et al., 2017).
Identifiability	In social media, the 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., 2010), "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 (Lee et al., 2014; Treem & Leonardi, 2013), also referred to as "durability" (Evans et al., 2017) and "recordability" (Toma, Hancock, & Ellison, 2008).
Scalability	Social media enable users to reach users and information out of their own network (boyd, 2007).
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, 2013).

Table 1. Initial coding and definitions of social media affordances.

In the iterative data coding, every uninterrupted utterance of a group participant in the highlighted text, that is, 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 wherever possible. After this phase, the initial coding frame was reassessed and underwent subsequent revisions.

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 two-step inductive analysis process. First, data that could not be coded into one of the codes in phase 1 were reexamined to describe as new affordances. The analysis suggests that there was no new affordance emerged. Next, the first author 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 identifiability was described as similar to the visibility of identification. The final categories and selected examples are listed in Table 2.

Affordances	Description and examples
Association	<p>Remarks indicating the actions of establishing relationships.</p> <p>Examples:</p> <p>LinkedIn - <i>"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."</i></p> <p>WhatsApp - <i>"Then there's WhatsApp obviously because every class has a WhatsApp group 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."</i></p>
Editability	<p>Remarks describing the actions of editing information in social media.</p> <p>Examples:</p> <p>WhatsApp - <i>"So that's how people, you know when sometimes group chats getting out of control, sometimes people want to put in important information, they will just bold the words to catch everyone's attention."</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></p>
Immediacy	<p>Remarks indicating notifications or reply that may trigger immediate engagement.</p> <p>Examples:</p> <p>Google Office - <i>"So Google Office, the good point is that it is really instant, it doesn't lag."</i></p>
Interactivity	<p>Remarks describing actions of interacting with others.</p> <p>Examples:</p> <p>Quora - <i>"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."</i></p>
Persistence	<p>Remarks indicating actions related to saving and retrieving information.</p> <p>Examples:</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></p>
Scalability	<p>Remarks indicating the possibilities to extend the current social network or knowledge base.</p> <p>Examples:</p> <p>Podcast - <i>"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."</i></p> <p>Wikipedia - <i>"And also in Wikipedia there are lots of references, so it can be a starting point...like if the journal I am interested in then I'll just jump to the references."</i></p>
Searchability	<p>Remarks describing the actions of searching information or users in social media.</p> <p>Examples:</p> <p>WhatsApp - <i>"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."</i></p>
Manageability	<p>Remarks suggesting actions of using the settings to manage and control the information and users in social media.</p> <p>Examples:</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></p>
Modality	<p>Remarks indicating the formats of content in social media (e.g., textual, video, audio, visual, etc).</p> <p>Examples:</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></p>
Visibility	<p>Remarks indicating the awareness of users' identity, disclosures, implicit cues, and networks in social media.</p> <p>Examples:</p> <p>LinkedIn - <i>"You know. In LinkedIn, they have something like verified user so someday 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."</i></p> <p>Yahoo Answers - <i>"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."</i></p>

Table 2. Final coding scheme and selected examples of social media affordances.

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 MAXQDA12 software. One of the 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 first author (i.e., the first coder) initially reviewed the codes applied by the second coder. The two coders discussed the units with divergent opinions, and consensus was reached eventually for those units. This helped the coders to reach a consensus on the proper interpretation and application of each code. The second coder then recoded the initial group and coded one other randomly selected group. At the end of this process, a Cohen's Kappa, which has been the most often used index of reliability in social science (Zhao, Liu, & Deng, 2013), was calculated to determine the extent of agreement between the author and the second coder. The final Cohen's kappa is .83, indicating very acceptable agreement (Neuendorf, 2002).

RESULTS AND DISCUSSION

Following the coding process, we identified ten main categories of social media affordances, including association, editability, immediacy, interactivity, manageability, modality, persistence, scalability, searchability, and visibility. The affordance that was mostly mentioned by students in focus group discussion was visibility (20.7%), followed by persistence (14.2%) and interactivity (13.4%). Table 3 presents the frequency and percentage of each category of social media affordances. Each code was identified in every group, suggesting that additional groups would be unlikely to yield additional themes.

Affordances	Group 1		Group 2		Group 3		Total	
	f	%	f	%	f	%	f	%
Association	11	8.7	10	7.9	12	10.1	33	8.9
Editability	5	4.0	2	1.6	8	6.7	15	4.0
Immediacy	9	7.1	10	7.9	8	6.7	27	7.3
Interactivity	17	13.5	18	14.2	15	12.6	50	13.4
Manageability	13	10.3	13	10.2	12	10.1	38	10.2
Modality	13	10.3	15	11.8	11	9.2	39	10.5
Persistence	18	14.3	19	15.0	16	13.4	53	14.2
Scalability	10	7.9	10	7.9	9	7.6	29	7.8
Searchability	4	3.2	5	3.9	2	1.7	11	3.0
Visibility	26	20.6	25	19.7	26	21.8	77	20.7
Total	126		127		119		372	100.0

Table 3. Frequency and percentage of units within each group attributed to each affordance

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 participant talked about class groups in WhatsApp, *"Then there's WhatsApp obviously because every class has a WhatsApp group 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."*

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. *"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 student 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."* In this case, the editability might lead to manipulation of content by less-qualified users.

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, 2013). In social media, a social tie is best expressed through one's friends on a SNS, following a microblogger, subscribing to another's tags, or joining a group (Gibbs et al., 2013). For formal learning, students would establish unidirectional connections with knowledge users as supplementary learning resources. As one student described the use of Pinterest to follow knowledgeable users for her course on art design, *"You can actually follow other people. Because everyone has*

Immediacy

The affordance of immediacy refers to the extent to which social media enable users to get an immediate response or update (Majchrzak et al., 2013). In the learning context, this affordance facilitated the communication by enabling instant feedback from others. As one student 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 one 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 was the third most frequently identified affordances (13.4%), which 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 one student 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, the other student described how interactivity afforded by WeChat helped disseminate course-related information when the course instructor was restricted on 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.”*

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 student 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, *“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 predominantly textual and YouTube being visual and audio. One student 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 student 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.”* 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, 2013). 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 participant 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, *“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.

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 student shared her experience of learning from experts through Facebook groups, *“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 student 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.”*

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 thus particularly important when students face the issue of information overloading due to the use of social media. As one student mentioned 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, 2013). As a student 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.”*

Visibility

Visibility refers to the extent to which social media enable users to see others’ online behaviors and information (Treem & Leonardi, 2013). The affordance of visibility was consistently the most frequently mentioned affordance by all groups, with around 20% of all discussion related to social media affordances. Scholars have noted that social media provide increased visibility into both behaviors and information, which separates them from other traditional information and communication technologies (Rice et al., 2017; Treem & Leonardi, 2013). 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 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 but tended to decrease the degree of identity visibility by concealing their personal information. For instance, a 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 without the requirement of immediate engagement. As one student 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 one 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.”*

CONCLUSION

This exploratory study of students’ voluntary use of social media for formal learning has identified ten consistent affordances enabled by current social media technologies. These findings contribute to the existing field of technology use in education in several ways. First, to our knowledge, this is the first study that draws on an affordance perspective to investigate social media use for formal learning in the voluntary context. Specifically, instead of focusing on any particular feature or technology, an

affordance view on social media use provides a theoretical foundation to understand students' awareness of resources that various social media can offer in the voluntary context. Second, unlike existing research on the adoption of a particular social media, this study considers a broader set of available technologies. This helps to create a dynamic picture of how social media can sustain and support students' learning in the voluntary context. Future research could thus conduct a more nuanced analysis of a specific affordance or combination of these affordances and their effects on student's learning outcomes.

The findings of this study also reveal practical insights into the ways of integrating social media in formal education as well as lifelong learning. For educators and policymakers, this study can help them understand how social media can be used for learning from the perspective of students. To prepare students to become independent learners, there is a need to provide students with opportunities to practice and acquire expertise in selecting and integrating a meaningful combination of available tools. The social media affordances identified in this study could thus be used to provide a guidance, with the goal of raising students' awareness of using emerging technologies for lifelong learning. For students, it is expected that the findings of social media affordances could help them make sense of resources offered by available tools, thus enhancing the capacity to make use of the tools proactively, instead of passively, to feed their learning curiosity.

There are some limitations in the present study that warrants future research. First, social media discussed in all focus groups were mainly popular tools familiar to our participants who were based in Singapore. It is possible that students in other countries may voluntarily use other kinds of social media to support formal learning. Future studies should address the generalizability of this study to other areas and cultural groups. Another limitation is that this study only engaged in an inductive approach to identify the affordances of social media for students' formal learning in voluntary context; hence measures indicating the extent to which those affordances are perceived by students are not the focus of this study. Nevertheless, the identified affordances can serve as a useful starting point for deductive research, in which instruments can be developed to verify the distinct affordances in a survey with a larger sample size.

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