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2015

Guo, Y. R., Goh, D. H.-L., Luyt, B., Sin, S.-C. J., & Ang, P.-H. R. (2015). The effectiveness and acceptance of an affective information literacy tutorial. *Computers & Education*, 87, 368-384.

<https://hdl.handle.net/10356/102937>

<https://doi.org/10.1016/j.compedu.2015.07.015>

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The Effectiveness and Acceptance of an Affective Information Literacy Tutorial

Yan Ru Guo, Dion Hoe-Lian Goh, Brendan Luyt, Sei-Ching Joanna Sin
Nanyang Technological University, Wee Kim Wee School of Communication and Information

31 Nanyang Link, Singapore 637718

Email: {w120030, ashlgoh, brendan, Joanna.sin}@ntu.edu.sg

Rebecca P. Ang

National Institute of Singapore

1 Nanyang Walk, Singapore 637616

Email: Rebecca.ang@nie.edu.sg

Correspondence concerning this paper should be addressed to Yan Ru Guo, Wee Kim Wee School of Communication and Information, Nanyang Technological University, 31 Nanyang Link, Singapore 637718.

Email: W120030@ntu.edu.sg

Abstract

Due to the ready access to large amounts of information afforded by the Internet, information literacy (IL) has taken on an important role. Recent developments in affective computing have provided more opportunities in the way online IL education can be delivered. However, research on how affective computing can be used in IL education is lacking. The research objectives of this study are therefore twofold: to investigate the influence of affective embodied agents (EAs) on students' motivation, enjoyment, knowledge retention and intention to use; and to uncover factors influencing their intention to use an online IL tutorial with affective EAs.

To achieve these objectives, 285 university students were recruited to participate in a between- subjects experiment (text-only, non-affective EAs, and affective EAs), including completing an IL tutorial and a post-test questionnaire. The results suggested that students benefited from the added use of an affective EA in the IL tutorials, in terms of learning motivation and enjoyment. Moreover, relevance, confidence, satisfaction, affective enjoyment, and behavioral enjoyment were found to be significant predictors for intention to use an IL tutorial with affective EAs.

1. INTRODUCTION

Information literacy (IL) education has become the shared responsibility of all educators and information providers (Thomas, Crow, & Franklin, 2011). While face-to-face instruction is a commonly adopted method in IL education, online education has been on the rise. Compared to face-to-face instruction, online education is not constrained by location or time, can be tailored to fit the learning pace of each student, and is a suitable conduit for lifelong learning. However, it also has its drawbacks, such as high dropout rates, absence of personal touch, and the lack of motivation by students to participate when it is not required by the instructors (Williams, 2010). In conventional face-to-face learning environments, skilled tutors pay as much attention and spend as much time helping students achieve affective goals, as they do to help them achieve cognitive and informational ones (Lepper & Chabay, 1988). Online education should therefore not neglect the affective aspects of learning.

Affective states can be infused into online learning systems by using music, background setting, colors, narration, but most commonly via interface characters, also referred to as “avatars” or “agents” (Salen & Zimmerman, 2005). An embodied agent (EA) refers to a life-like agent, i.e., one with a physical face and body (Atkinson, 2002). Accordingly, an affective EA is one that is capable of eliciting certain affective experiences from users through multiple modalities such as speech, facial expressions and body gestures (Beale & Creed, 2009). Affective EAs are becoming increasingly popular as a way to incorporate affective elements in communications between humans and computers (Becker-Asano & Wachsmuth, 2010). Studies have found that the use of affective EAs in a pedagogical role such as an instructor, mentor, assistant, and companion, not only can increase students’ learning motivation and learning efficacy, but also help them overcome negative feelings such as boredom or frustration during learning process (Conati & Zhao, 2004; Mumm & Mutlu, 2011).

Despite their potential, there is a dearth of research in using affective EAs in online IL education. At the same time, research has found that students’ development of IL skills are often impeded by negative affective feelings such as fear of the library, and anxiety from the worry that needed information cannot be found (Fang, Chan, Brzezinski, & Nair, 2010). Therefore, the ability to predict and respond to a user’s affective state might play an important role in improving the effectiveness of online IL education. There is much to be learnt in this area, and the present study is a step in

this direction, investigating students' learning attitudes, enjoyment and knowledge retention towards an IL tutorial with affective EAs.

Equally important, understanding students' attitudes towards online IL education is critical to improve its usage. As noted by Venkatesh, Morris, Davis, and Davis (2003), users' motivation and enjoyment are strong predictors of intention to use new technologies. However, their influence has rarely been taken into consideration or formally evaluated in online IL educational systems (Guo, Goh, & Luyt, 2014). IL education differs from other domains as it involves higher-order thinking skills, skills activated when individuals encounter unfamiliar problems, uncertainties or discrepancies before they start information seeking (King, Goodson, & Rohani, 2009). Thus it requires different teaching strategies and learning environments from lower-order thinking skills. The concern over students' affective states should be reflected in online IL instruction. Therefore, by examining the impact of students' learning motivation and enjoyment from the IL tutorial with affective EAs, we hope to contribute to the body of knowledge in this area.

The objectives of the present paper are thus two-fold. The first is to evaluate the impact of affective EAs in an online IL tutorial on students' motivation, enjoyment, knowledge retention and intention to use. The second is to investigate the influence of motivation and enjoyment on students' intention to use an IL tutorial with affective EAs. In particular, the affective online tutorial in this study addresses the affective aspects of IL education, and differs from existing ones that primarily focus on imparting cognitive knowledge to students. A widely used information behavior and IL model, the Information Search Process (ISP) Model, was employed to develop the tutorial (Kuhlthau, 2004).

2. THEORETICAL FRAMEWORK

2.1 Related Work

2.2.1 *Online Information Literacy Education*

Compared to face-to-face IL instruction, online education presents a more effective method of reaching a large number of students (McClure, Cooke, & Carlin, 2011). The availability of online tutorials means that they can be accessed anytime

and anywhere, and reused as needed (McClure et al., 2011; Williams, 2010). Students may also receive instruction at the point of need, and not be subjected to a schedule by libraries.

It has been increasingly used by libraries in IL education. For example, Florida Gulf Coast University (2014) developed an online IL tutorial, which follows step-by-step the ACRL standards and the ISP Model. Results of an evaluation of the tutorial (McClure et al., 2011) suggested that the students who completed the online tutorials cited more sources and a greater variety of sources, compared with those from the control group. In another example, Western Michigan University (2014) created an online IL tutorial called *ResearchPath*, incorporating multimedia elements to provide a range of stimuli for learning. It was evaluated against a previous version and students were found to express a stronger satisfaction and preference for *ResearchPath* (Sachs, Langan, Leatherman, & Walters, 2013). The authors concluded that such satisfaction may lead to more positive perceptions and attitudes towards the library.

2.1.2 *Affect in Information Seeking*

It is now known that learning is associated not only with cognitive ability but also with affect (Lopatovska & Arapakis, 2011). While positive affect has been found to produce advantages in information process, such as facilitating systematic processing of information, thus leading to more effectiveness and efficiency in problem-solving, students' development of IL skills is often impeded by negative feelings such as fear of the library, and anxiety in finding the information needed (Mellon, 1986). Therefore, the ability to recognize a user's affective state might play an important role in improving the effectiveness of online education. Moreover, the use of affect is most effective when infused into complex, demanding situations that require open, constructive processing, such as during information seeking process (Forgas, East, & Chan, 2007).

There is hence a new movement to take these into consideration in online IL education, and one of the seminal works, Kuhlthau's (1983, 1991, 2004) ISP Model, though developed for offline information environment, can be adopted in online IL educational context. Although called an ISP Model, its scope covers most of what is

included in IL education models and standards. Additionally, scholars have identified five stages in conducting online research, namely, identifying problems, locating, evaluating, synthesizing and communicating information (Lankshear & Knobel, 2011; Leu, Kinzer, Coiro, & Cammack, 2004; Leu, Kinzer, Coiro, Castek, & Henry, 2013). As can be seen, these five stages are highly parallel to the six in the ISP Model. Therefore, the ISP Model is treated not merely as an information seeking process model, but an encompassing IL education model (Thomas et al., 2011; Wilson, Ford, Ellis, Foster, & Spink, 2002).

In the model, Kuhlthau (2004) highlighted a user's affective states during the information seeking process, viewing information seeking as a constructive, vigorous process, that involves not only thoughts and actions, but also feelings. The ISP Model is divided into six stages, namely, task initiation, topic selection, prefocus exploration, focus formulation, information collection and search closure. It predicts situations during which information seekers are likely to experience positive affective states such as confidence and assurance, and situations during which they are likely to experience negative affective states such as anxiety and frustration.

2.1.3 Affective Embodied Agents

One way to incorporate affect in online education is to use affective EAs. Studies have shown that the use of affective EAs can foster students' engagement in online learning (Atkinson, 2002). With EAs, learners are more motivated to make sense of what is being presented to them, and more likely to process the information deeply. For example, Doumanis and Smith (2013) designed two tour guide applications, one with an EA and one without. The results indicated that participants who used the system with the EA retained cultural knowledge more consistently than those without. More interestingly, participants' comments indicated that the use of EAs positively impacted the perception of knowledge difficulty. That is, participants perceived the content as less complex when it was presented by the system with the EA. This change of perception can potentially lead to enhanced motivation and higher learning efficacy to learn more difficult content.

Other than changing the perceptions of knowledge difficulty, affective EAs can positively influence learners' learning motivation and self-efficacy by easing

possible negative affect during learning. For example, Lee et al. (2007) designed an affective EA as a learning companion in learning English idioms, and examined its impact on learners. The findings demonstrated that the use of affective EA led to greater perceived support, and fostered more trusting relationship between the communicators. The ability of affective EAs to reduce negative affect is especially important in this study, since negative affect has been found to be common in the information seeking process. In prior work, Guo et al. (2014) studied the use of affective EAs in IL education, and found that students in the affective-EAs group were more motivated and derived more enjoyment in acquiring IL knowledge compared to those in neutral-EAs and no-EAs groups. However, that study did not investigate the EAs' impact on students' intention to use IL tutorials, and the roles that motivation and enjoyment play. Studying these relationships would be beneficial to facilitate the integration of affective EAs into IL education.

2.2. Hypotheses Development

This section will present the research hypotheses and explicate the four major constructs used in the study: motivation, enjoyment, knowledge retention, and intention to use.

2.2.1 *Motivation*

Motivation may be considered one of the most important components of learning, and it is a catalyst to achieving one's goals. Put simply, a high level of motivation is often a prerequisite for success, and there is a high probability that learning will not be successful when there is a lack of motivation (Keller, 1993). Moreover, motivation is also a key factor driving intention to use (Venkatesh et al., 2003). Studies have found that the use of affective EAs can minimize the communicative gaps in interactions between human and computers, and increase learners' motivation (Lin, Atkinson, Christopherson, Joseph, & Harrison, 2013).

Designed by Keller (1993), the ARCS Model was used as a tool for measuring the motivational support provided by instructional programs, and for diagnosing motivational problems and prescribing motivational strategies. There are four components in the ARCS Model: attention, relevance, confidence and satisfaction.

Attention is the first and regarded as a critical prerequisite for learning. Keller (1993) contended that to sustain students' attention, instructors should respond to the sensation-seeking needs of the students. In the context of our study, the sensation-seeking response was to focus on students' affective states. It is hence reasonable to suggest that when an educational system is able to attract users' attention, it is more likely to get used (Venkatesh et al., 2003). The second component is relevance, defined as the extent to which the students perceive the results to be applicable, relevant, usable and helpful for the actions taken. Relevance is commonly used as a criterion to evaluate whether using an educational system can meet their utilitarian needs. In a study of tourists' intention to visit destinations, relevance was found to be a significant predictor of behavioral intention to use (Mellon, 1986).

The third component is confidence, which refers to the learners' positive expectations towards their performance, and their belief that they have the required knowledge, skill or ability to perform a certain task. Researchers have found that confidence had a significant positive influence on behavioral intention to use an educational system (Venkatesh et al., 2003). The last is satisfaction, which refers to the extent that users feel good about their accomplishments. While satisfaction correlates with behavioral intention, higher level of satisfaction contributes to the learners' intention to use the educational system.

The ARCS Model has been shown to be practical and widely applicable across different instructional settings. For example, Hirumi, Sivo, and Pounds (2012) used the ARCS Model to evaluate students' learning motivations in two online courses, and supported its applicability as an instrument to measure learning motivation in the context of online instruction. Similarly, ChanLin (2009) incorporated specific strategies to foster students' attention and confidence based on the ARCS Model. Students reacted positively to these strategies, reporting higher levels of motivation. Other studies have been conducted in interactive online environments. For example, Kebritchi, Hirumi, and Bai (2010) used the ARCS Model to measure the effect of a mathematical computer game on students' motivation. These examples illustrate that the ARCS Model can be applied to empirically investigate motivational issues. Based on the above discussion, we propose the following hypotheses:

H1: There are significant differences in the means of (a) attention, (b) relevance, (c) confidence, and (d) satisfaction among text-only, non-affective EAs, and affective EAs groups.

2.2.2 *Enjoyment*

Enjoyment has been well studied in media research. It refers to the extent of using information systems being perceived as providing pleasure and joy (Fang et al., 2010). Individuals who have enjoyed a particular media experience may be in a better mood and seek out that experience again in the future. In other words, enjoyment is a strong indicator of media use intention (Venkatesh et al., 2003). Further, enjoyment is positively associated with not only behavioral intention to consume media, but also actual usage frequency (Moon & Kim, 2001).

Accordingly, a considerable number of studies have examined enjoyment in various kinds of information systems. Researchers argued that enjoyment is a multifaceted concept, encompassing affective, cognitive and behavioral dimensions (Nabi & Krcmar, 2004). Specifically, affective enjoyment refers to the willingness to invest emotionally in the experience, and studies have shown that technology use triggers affective reactions from individuals and influences subsequent actions. It focuses largely on empathy, as well as positive and negative affective states. Cognitive enjoyment is defined as the willingness to develop skills and solve problems. It focuses on experiences gained through personal judgment relative to actions or tasks appearing in the media (e.g., judgment about appropriateness of tasks). When cognitive learning results in better outcomes, individual's intention to use increases significantly (Jackson, Chow, & Leitch, 1997). Furthermore, behavioral enjoyment is the willingness to participate on a behavioral level, especially concerning their effortless involvement in the media (e.g., little or no awareness of their behaviors). Thus the following hypotheses were proposed:

H2: There are significant differences in the means of (a) affective enjoyment, (b) cognitive enjoyment, and (c) behavioral enjoyment among text-only, non-affective EAs, and affective EAs groups.

2.2.3 Knowledge Retention

Although it has been pointed out that the instructional effectiveness of using affective EAs is sometimes due to its novelty, rather than real increased knowledge retention by students, knowledge retention is still an important construct to measure because it is the most direct and immediate result from the intervention (Atkinson, 2002). Available research has demonstrated that using affective EAs in multimedia learning environments can enhance learners' ability to retain the knowledge and apply it in other contexts (Lee et al., 2007). Therefore knowledge retention is the third construct in the study, to ascertain the amount of knowledge retained by students after watching the tutorial. We thus propose the following hypotheses:

H3: There are significant differences in the means of knowledge retention among text-only, non-affective EAs, and affective EAs groups.

2.2.4 Intention to Use

Intention to use refers to the degree to which the participants have formulated plans to perform or not perform a specified behavior in the future (Venkatesh et al., 2003). In this study, it refers to students' intention to use similar tutorials to further improve their IL knowledge, since IL is a very broad term encompassing many skills (Thomas et al., 2011). Intention to use has frequently been used as an equivalent for the actual performance of the behavior, as the two have immediate causal relationship: intention to use determines actual performance (Olson, 2009). Given this discussion, the following hypotheses are proposed:

H4: There are significant differences in the means of intention to use among text-only, non-affective EAs, and affective EAs groups.

Additionally, if students can be motivated in the early stages of learning, they are more likely to engage in sustained learning behaviors (Keller, 1993). Moreover, enjoyment has been found to be a robust determinant of behavioral intention to use information systems (Venkatesh et al., 2003). Therefore, we expect that students' usage intention is positively associated with motivation and enjoyment derived from the IL tutorial with affective EAs. Thus two more hypotheses are proposed:

H5: Motivation in terms of (a) attention, (b) relevance, (c) confidence, and (d) satisfaction, is positively associated with intention to use the affective IL tutorial.

H6: Enjoyment in terms of (a) affective enjoyment, (b) cognitive enjoyment, and (c) behavioral enjoyment, is positively associated with intention to use the affective IL tutorial.

3. METHOD

3.1 Experimental Design

A between-subjects design was used to address the first research objective, and the participants were divided into three groups: the affective EAs tutorial group, non-affective EAs tutorial group and text-only tutorial group. Specifically, a matched-subjects design was employed, where individuals in one group were matched on their gender and educational background with those in the other two groups. Participants were first split according to their educational major, and within the different educational majors, they were further matched based on their gender. This approach is consistent with the work of other studies such as Lin et al. (2013), and Mayer and DaPra (2012).

Recruitment was conducted in two major local universities. Participation in this study was voluntary and anonymous, and no information that could be used to identify individuals was collected. The study was conducted with multiple batches of participants in a controlled laboratory setting. First, participants were briefed on the purpose of the study, which is to evaluate a newly developed IL tutorial. After signing the online consent form, they were directed to the study's main website. From this site, they were assigned to one of the three groups based on their gender and educational background as described above. A window then popped up with the respective tutorial, and participants had to complete it before proceeding to the post-test questionnaire. The entire study lasted approximately 25 minutes. In total, 285 students participated.

3.2 Post-test Questionnaire

After finishing the assigned tutorial, participants were required to complete a post-test questionnaire comprising six sections. The first two sections and the fourth section focused on students' learning motivations, enjoyment and their intention to

use similar IL tutorials. All question items that were used to measure these three constructs were formulated based on extant literature, and indicated on a five-point Likert scale ranging from strongly disagree to strongly agree, with a neutral response in the middle. The third section tested the amount of knowledge that students retained from the tutorial. In the penultimate section, participants were asked for their subjective opinions of the tutorial, and how to improve it. Lastly, information on participants' demographic data such as age, gender, computer experience, and perceived computer knowledge was collected at the end of the questionnaire.

A pilot study was carried out with 22 university students to gather feedback for the online tutorial and the post-test questionnaire. Based on their comments, some sentences were simplified in the tutorial, the order of the questions was adjusted, and ambiguous wordings were made clearer in the questionnaire.

3.3 Operational Definitions

Motivation. The ARCS scale from Keller (1993) was adapted with minor changes on the context of use (see Appendix A). Specifically the original context was to investigate the motivational issues in courses and modules. So our study used the word “instructional program” instead of “modules/courses” as in the original items. The scale consisted of 36 items, in which 12 items measure attention; nine items measure relevance; nine items measure confidence, and six items measure satisfaction.

Enjoyment. This was assessed with 12 items that were based on the tripartite model (affective enjoyment, cognitive enjoyment, and behavioral enjoyment) proposed by Fang et al. (2010). Though this instrument was developed to measure enjoyment of computer games, it has been used to evaluate other information systems such as online shopping website and online education (Im & Ha, 2011; Nyberg & Berg 2014). Modifications were made to suit this study's purpose. The use of “game” in the original scale was replaced by “instructional program” to refer to the IL tutorial under evaluation in this study (see Appendix B).

Knowledge retention. This was evaluated using 13 questions, all of which were developed by the authors, based on the content from the tutorial (see Appendix C). The set of questions includes five multiple-answers questions, six true-or-false questions, and two fill-in-the-blank questions. The multiple-answers and true-or-false

questions were designed to assess recognition memory performance, and answering each question correctly was worth 1 point. Examples include: *“Which of the following are the typical information sources for academic information?”*, *“Citations are important in academic writing because ...”*, and *“How many different stages are there in a typical academic information search process?”* The two fill-in -blank questions assessed participants’ recall memory performance, and asked them to name at least one academic citation style and database. The scoring for these two questions was rated 0-2 points, where wrong answers or unfilled blanks are 0, one correct answer is 1, and more than one correct answers worth 2 points. Partial points were given for imperfect answers with grammatical or spelling mistakes.

Intention to use. Three items were used to measure intention to use, all of which were adopted from an existing survey instrument (Venkatesh et al., 2003). The use of “system” was replaced with “tutorial” to suit the context of this study. The three items are: *“I am willing to use this tutorial”*, and *“Assuming I have access to the tutorial, I intend to use it”*, and *“Given that I have access to the tutorial, I predict that I would use it”*.

3.4 Design of the Information Literacy Tutorial

A 15-minute online tutorial was created using Adobe Flash. There are two EAs in the tutorial, one representing a young female student (see Figure 1), Amy, who is new to academic information seeking, and another representing an experienced female teacher (see Figure 2), Ms. Tan, who guides Amy through the information seeking process. Different search strategies were taught in the tutorial, with emotions manifested from both the student and teacher. Amy and Ms. Tan maintained a visual presence throughout the tutorial, and conversations and instructions were presented in speech bubbles (see Figure 3). This mirrors the approach by Maldonado et al. (2005), where they isolated the effects of EAs in an experimental study with three conditions: No Colearner Present, No Emotion Colearner, and Cooperative Colearner, and evaluated their influence on students’ learning performance and experience.

Figure 1. Student EA (Amy)

Figure 2. Teacher EA (Ms. Tan)

Figure 3. Screenshots of Affective-EAs Tutorial

Facial expressions are arguably the most important design feature of affective EAs, as they are one of the primary ways through which feelings can be communicated. Facial expressions can also influence learners' perception of the EAs as virtual social models (Beale & Creed, 2009). The two EAs' facial expressions in our study included lip motions, eye gaze, and head motions to show smile, empathy, encouragement, satisfaction, and excitement. Other than facial expressions, speech (e.g., *"Don't worry"*, *"You can make it"*) and body gestures (e.g., stretching arms,

pointing gestures at the beginning of an explanation) were used to complement or elaborate on speech content, in order to express affective states more effectively.

The structure of the tutorial resembled that of the ISP Model, and its storyline mirrored the stages of ISP Model closely (see Figure 4 for an example). At first, Amy is presented with a list of topics from which she could choose to write a literature review. She selects the topic of storytelling, and is immediately aware of her lack of knowledge, and of the need for information. This awareness in information seekers is frequently accompanied by feelings of uncertainty and apprehension (Kuhlthau, 2004). Ms. Tan guided Amy from the start, assuring her that she is not alone in feeling uncertain in such situations. Amy starts to look for information, and this stage is typically marked by feelings of confusion, uncertainty, and doubt. Ms. Tan shows empathic emotions and employs empathic words, such as “*This is normal*” to encourage Amy. Additionally, Ms. Tan introduces Amy to the skills required to retrieve more relevant information, such as the use of Boolean operators, and the techniques of backward and forward chaining. For Amy, the next stage involves the gathering of more information, which is accompanied by an increased level of confidence. As the assignment nears completion, Amy feels relieved and a sense of satisfaction. Finally, as Amy prepares to begin writing, her search process concludes (Kuhlthau, 2004).

Figure 4. Screenshots in Information Collection Stage (Affective-EAs Tutorial)

As part of our study, two other versions of the IL tutorial were created: text-only and non-affective EAs. In the text-only version (see Figure 5), the two EAs were absent, with only textual instructions presented in square dialog boxes. In the non-affective EAs version (see Figure 6), Amy and Ms. Tan maintained visual presence throughout; however, they displayed no affective expressions. Here, conversations

and instructions were presented in speech bubbles.

Figure 5. Screenshots of Text-only Tutorial

Figure 6. Screenshots of Non-affective EAs Tutorial

3.5 Data Analysis Methods

Prior to analyzing the data, principal component analyses (PCA) were carried out to ensure that items under each construct were more related to its own construct than others. Only items that were highly loaded (those with a loading of 0.5 and above) were considered satisfactory and retained in subsequent analyses.

The reliability of the study constructs was analyzed using principal component analyses and intraclass correlation coefficient (ICC). H1 to H4 were tested using one-way analysis of variance (ANOVAs), and H5 and H6 were tested with multiple regression. The analyses were conducted using SPSS.

4. RESULTS

4.1 Sample Characteristics

The demographics of the sample are shown in Table 1, including the breakdown across the three groups. The sample consisted of 104 (36.49%) men and 181 (63.51%) women. There were 35 men and 60 women in the text-only group, 36 men and 59 women in the non-affective EAs group, and 33 men and 62 women in the affective EAs group. The sample age ranged between 18 and 30, with an average of 21.21 years. With regards to their educational background, more than half (58.25%) were from arts, humanities and social science, around a quarter (25.61%) were from engineering, and the rest 16.14% were from the natural sciences.

Table 1. Demographics of Sample ($n=285$)

	Text-only		Non-affective EAs		Affective EAs		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender								
Women	60	63.16	59	62.11	62	65.26	181	63.51
Men	35	36.84	36	37.89	33	34.74	104	36.49
Age								
≤20	29	30.53	29	30.53	31	32.63	89	31.23
21–25	58	61.05	55	57.89	53	55.79	166	58.25
26–30	8	8.42	11	11.58	11	11.58	30	10.52
Educational Background								
Arts and social science	51	53.68	57	60.00	58	61.05	166	58.25
Engineering	28	29.47	25	26.32	20	21.06	73	25.61
Natural Science	16	16.84	13	13.68	17	17.89	46	16.14

4.2 Principal Components Analysis and Reliability Analyses

The results from PCA are discussed below.

Motivation. Four factors emerged from the PCA, with Cronbach's alpha values of 0.805 ($M = 3.39$, $SD = 0.82$) for attention, 0.842 ($M = 3.20$, $SD = 0.73$) for relevance, 0.872 ($M = 3.22$, $SD = 0.90$) for confidence and 0.856 ($M = 3.53$, $SD = 0.76$) for satisfaction.

Enjoyment. With regards to enjoyment, the PCA yielded three factors, with Cronbach's alpha value of 0.887 ($M = 2.62$, $SD = 0.68$) for affective enjoyment, 0.903 ($M = 3.68$, $SD = 0.85$) for cognitive enjoyment and 0.837 ($M = 2.79$, $SD = 0.30$) for behavioral enjoyment.

Intention to Use. The PCA yielded a single category with Cronbach's alpha value of 0.83 ($M = 3.30$, $SD = 0.94$) for intention to use.

Knowledge retention. The set of questions were developed iteratively and revised based on feedback from a pilot study, where participants were recruited to assess their face validity, and to make sure that the difficulty level and wording were appropriate. While other questions (multiple-choice and true-or-false questions) were graded automatically, the two fill-in-blank questions were graded by the first author and an external coder independently. ICC was used to assess reliability (Lee et al., 2007). Since the answers to the two questions were clear, the ICC was 0.97 and 0.98, implying high reliability.

4.3 Comparison of Tutorials

To address the first research objective, we hypothesized that there are significant differences in the means of motivation, enjoyment, knowledge retention and intention to use, among text-only, non-affective EAs, and affective EAs groups. Given the differential proportion of participants by gender, a Chi-square test was conducted to determine whether gender influenced the results. The observed Chi-square value indicated that groups did not differ significantly on gender proportion ($p < .05$). Results (see Table 2) from one-way analysis of variance (ANOVAs) indicated that there were significant differences among text-only, non-affective EAs, and affective EAs groups, with respect to attention [$F(2, 282) = 56.96$, $p = .006$]; relevance [$F(2, 282) = 3.12$, $p = .032$], satisfaction [$F(2, 282) = 9.97$, $p = .006$], affective enjoyment [$F(2, 282) = 7.12$, $p = .008$], and intention to use [$F(2, 282) = 7.38$, $p = .007$]. On the other hand, there were no statistically significant differences among text-only, non-affective EAs, and affective EAs groups, between confidence [$F(2, 282) = 0.70$, $p = .500$], cognitive enjoyment [$F(2, 282) = 2.99$, $p = .052$], behavioral enjoyment [$F(2, 282) = 1.99$, $p = .524$], and knowledge retention [$F(2, 282) = 1.03$, $p = .357$].

Table 2. Mean and SD of Dependent Variables

Variables	Tutorial Type					
	Text-only		Non-affective EAs		Affective EAs	
	(n=95)		(n=95)		(n=95)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Motivation						
H1a Attention**	3.36	0.43	3.31	0.43	3.52	0.38
H1b Relevance*	3.48	0.45	3.47	0.44	3.62	0.50
H1c Confidence	3.24	0.56	3.15	0.59	3.23	0.44
H1d Satisfaction**	3.16	0.52	3.10	0.51	3.40	0.45
Enjoyment						
H2a Affective**	2.48	0.79	2.50	0.74	2.87	0.85
H2b Cognitive	3.59	0.85	3.61	0.70	3.82	0.65
H2c Behavioral	2.69	0.76	2.81	0.72	2.89	0.68
H3 Knowledge Retention	1.10	0.29	1.15	0.31	1.09	0.32
H4 Intention to Use**	2.88	0.61	3.20	0.73	3.24	0.74

Notes: *Statistically significant differences at $p < .05$.

**Statistically significant differences at $p < .01$.

Post-hoc comparisons using Tukey's test were then conducted to obtain more specific information on group comparisons. The results are summarized in Table 3.

Table 3. Post-hoc Test of Dependent Variables

Variable	Type (1)	Type (2)	Mean Difference (1) - (2)
Motivation			
Attention	Text-only	Non-affective EAs	.05
	Text-only	Affective EAs	-.16*
	Non-affective EAs	Affective EAs	-.22**
Relevance	Text-only	Non-affective EAs	.01
	Text-only	Affective EAs	-.14
	Non-affective EAs	Affective EAs	-.15
Confidence	Text-only	Non-affective EAs	.08
	Text-only	Affective EAs	.01
	Non-affective EAs	Affective EAs	.07
Satisfaction	Text-only	Non-affective EAs	.07
	Text-only	Affective EAs	-.24**
	Non-affective EAs	Affective EAs	-.31**
Enjoyment			
Affective	Text-only	Non-affective EAs	-.02
	Text-only	Affective EAs	-.39**
	Non-affective EAs	Affective EAs	-.37**
Cognitive	Text-only	Non-affective EAs	-.02
	Text-only	Affective EAs	-.24
	Non-affective EAs	Affective EAs	-.22
Behavioral	Text-only	Non-affective EAs	-.13
	Text-only	Affective EAs	-.20
	Non-affective EAs	Affective EAs	-.08
Knowledge Retention	Text-only	Non-affective EAs	-.05
	Text-only	Affective EAs	.01
	Non-affective EAs	Affective EAs	.06
Intention to Use	Text-only	Non-affective EAs	.04
	Text-only	Affective EAs	-.35**
	Non-affective EAs	Affective EAs	-.32**

Notes: *Statistically significant differences at $p < .05$.

**Statistically significant differences at $p < .01$.

First, under the motivation construct, participants had better attention towards the affective EA ($M = 3.52$) than both the text-only ($M = 3.36$) and non-affective EAs groups ($M = 3.31$), and the differences were statistically significant. In terms of satisfaction achieved after viewing the tutorial, the affective EAs ($M = 3.40$) was significantly higher than both non-affective EAs ($M = 3.10$) and text-only group ($M = 3.16$). Moreover, though students in the affective EAs group rated slightly higher on relevance than those in the non-affective EAs and text-only groups, all pairwise comparisons were insignificant. However, there were no statistically

significant differences on confidence between pairwise comparisons among the three groups. This suggests that participants in the three groups had similar levels of confidence when going through the tutorial.

Second, for affective enjoyment, the affective EAs group ($M = 2.87$) had a significant difference over the non-affective EAs ($M = 2.50$) and text-only ($M = 2.48$) groups. There were no differences between the text-only and non-affective EAs group. Nonetheless, for both cognitive and behavioral enjoyment, there were no statistically significant differences in cognitive enjoyment between pairwise comparisons among the three groups. Surprisingly, pairwise mean differences on knowledge retention across the three groups were insignificant. Lastly, the post-hoc tests showed significant differences on intention to use. Participants who interacted with the affective EAs indicated higher likelihood to use the affective tutorial ($M = 3.24$) than those in text-only ($M = 2.88$) and non-affective EAs groups ($M = 3.20$).

4.4 Investigation of User Acceptance

To address the second research objective, only data in the affective EAs group was used in subsequent analysis. The hypotheses are that motivation and enjoyment are positively associated with intention to use the affective IL tutorial. Before testing them, variance inflation factor (VIF) and tolerance scores were examined to ensure the absence of multicollinearity. The results indicated that the problem of multicollinearity was not evident, with VIF scores less than 5 and tolerance scores more than 0.2 (Field, 2009). Thereafter, a multiple linear regression analysis was performed, where the four subconstructs of motivation and three dimensions of enjoyment were entered as the independent variables, and intention to use an online IL tutorial with affective EAs as the dependent variable (see Table 4).

Table 4. Multiple Regression Analysis ($n=95$)

	Hypotheses		Standardized β	t -values	R^2	Results
Motivation						
H5a	Attention	→ Intention to Use	.03	.45		×
H5b	Relevance	→ Intention to Use	.17	2.5**		✓
H5c	Confidence	→ Intention to Use	.14	2.6*		✓
H5d	Satisfaction	→ Intention to Use	.18	3.4**		✓
Enjoyment						
H6a	Affective Enjoyment	→ Intention to Use	.20	3.8*		✓
H6b	Cognitive Enjoyment	→ Intention to Use	.02	.31		×
H6c	Behavioral Enjoyment	→ Intention to Use	.16	2.5*		✓
					.65**	

Notes: *Statistically significant differences at $p < .05$

*Statistically significant differences at $p < .01$

The results revealed that 65% of the variance was accounted for in the model. Among the motivation measures, H5b, H5c, and H5d were supported. Only attention was not significantly associated with intention to use, while the rest were significant: relevance ($\beta = 0.17$, $p < .01$), confidence ($\beta = 0.14$, $p < .05$) and satisfaction ($\beta = 0.18$, $p < .01$). With regards to the measures on enjoyment, H6a and H6c were supported. Affective enjoyment ($\beta = 0.20$, $p < .05$) and behavioral enjoyment ($\beta = 0.16$, $p < .05$) were significant, while cognitive enjoyment was not significantly positively associated with usage intention of the affective IL tutorial.

5. DISCUSSION

Taken together, ANOVA results suggest that the use of affective EAs in the IL tutorial has a positive impact on several aspects of learning motivation, enjoyment, and on intention to use. However, there were no significant differences in knowledge retention across the three groups. As well, regression analyses results suggest that relevance, confidence, satisfaction, affective enjoyment and behavioral enjoyment can significantly predict intention to use the IL tutorial with affective EAs. The findings are discussed in the following sections.

5.1 Comparison of Tutorials

5.1.1 Motivation

The results show that participants who interacted with the affective EAs paid more attention to the tutorial than those in the other two groups (H1a). This is

consistent with findings of Dunsworth and Atkinson (2007), and Lee et al. (2007). Bandura (2001) contended that by observing other's behaviors, people could develop rules to guide their own subsequent actions, or be prompted to engage in previously learnt behaviors. Thus it is reasonable to believe that the behaviors of the EAs in the tutorial contributed to the increased attention level, and prompted participants to engage in learning. For example, one participant from the affective-EAs group remarked "*I am actually rather surprised that this program retained my attention (truthfully). I think what made it so is the cute and soft visual that was very appealing to me*". Conversely, one participant from the text-only group lamented that "*The design should be more eye-catching*".

Interestingly, participants from all three groups rated high on the construct of relevance (H1b), although the affective EAs group seems to have a slight, albeit statistically non-significant, edge over the other two groups. The consistent high rating on relevance construct is probably because the IL knowledge taught in the tutorials closely reflected participants' experience when completing assignments. The finding also indicates that the use of affective EAs did not increase the perceived relevance of the learning content. There were many similar comments about the high relevance in all three groups, such as "*This is especially relevant to us as our education in university requires us to write several term papers and we regularly find ourselves having to search for information online, but don't know where to look*".

Participants in the three groups reported a similar low level of confidence (H1c). This result seems to differ from past work where the use of affective EAs was found to increase the confidence and perceived learning efficacy (Kim & Wei, 2011). This might be because the overwhelming amount of educational content in the tutorial could have undermined the students' confidence, as many lamented that "*There is too much content in the tutorial*". Nevertheless, participants in the affective EAs group were more satisfied with the tutorial than those from the other two groups (H1d). Reeves and Nass (1997) asserted that the social cues provided by affective EAs can promote users to interact with the computers as if in human-to-human interactions, therefore facilitating the students' motivation in the learning process. This is also confirmed by comments from participants in the affective EAs group such as "*It is very informative and insightful at the same time in an engaging way I learnt something about what would have been really dry*". Another participant praised the

use of affective EAs as an innovative way of teaching IL, *“The animations and illustrations made a rather dry topic slightly more interesting”*.

5.1.2 Enjoyment

Participants who interacted with the affective EAs derived more affective enjoyment from the tutorial than those from the other two groups (H2a). This demonstrated that affective EAs indeed have a positive impact on students' affective enjoyment experience (Maldonado et al., 2005). One plausible factor is the empathic emotions displayed by the teacher EA in the affective EAs tutorial, which were received favorably by participants. For example, a remark is that *“The teacher showed the student why searching for information is not easy, and helped her through the difficulties”*. The empathic emotions from affective EAs led to greater perceived trustworthiness, as well as greater perceived caring and support felt by learners (Lee et al., 2007). Furthermore, an analogy between media enjoyment and physical travel may be used to explain the possible reasons, where the viewers of the media were transported into a narrative world (Green, Brock, & Kaufman, 2004). As in physical transportation, users go out of their original world as a result of being exposed to media, and when they return, they are somewhat transformed by the journey. The participants might relate their own feelings to that of the student EA's during information seeking process, and they began to see the EAs' perspective as their own. In the context of this study, participants connected with the affective EAs, and this experience resulted in an increase in enjoyment level, which was confirmed by comments such as *“The avatar makes the presentation alive and more realistic”*, and *“It is fun to see avatars in an academic presentation”*.

In contrast, participants in all three groups experienced high levels of cognitive enjoyment when going through the tutorials (H2b). This might be because the tutorial content was perceived to be highly informative and educational to participants. For example, one participant remarked that *“I like it, and the relevant content for first-year students who have just started writing research papers”*. Likewise, participants had similar levels of behavioral enjoyment across all three groups (H2c). Given the fact that this tutorial is deliberately simple by design, users only had to click to complete the whole tutorial. Some participants called for more

interactive ways in learning the IL tutorial, and they suggested that “*It could be more engaging by perhaps including a game related to the topic*”. This is a critical yet complex issue because of the need to balance both enjoyable media experience and effective learning. The behavioral enjoyment aspect will thus need to be further enhanced in future IL tutorials.

5.1.3 Knowledge Retention

There were no statistically significant differences across the three groups (H3). In fact, participants from all three groups scored equally unsatisfactorily, suggesting that students’ capacity to retain useful knowledge transcends affective EA mechanisms. A likely reason is that the novelty of incorporating EAs in IL instruction caused participants to engage in superfluous cognitive activities. Participants were more involved with how the tutorial was presented than what was presented in the tutorial. Such activities did not contribute directly to learning, but decreased the amount of knowledge retained (Dunsworth & Atkinson, 2007). This point is indicated by the observation that although a large number of participants in the affective EAs group remarked that using affective EAs in IL tutorials was “*cute and attractive*”, and “*unusual and refreshing*”, their knowledge retention was no better than those from the text-only group.

One possible reason for the low knowledge retention may be due to the nature of online multimedia environments, where physical presence of instructors is absent (Williams, 2010). Students need to be self-disciplined and responsible to keep up with the pace of the learning materials. In this case, participants may have failed to do so, resulting in the poor knowledge retention. Further, when asked about how to improve the tutorial, some participants wrote that “*It would be nice to have sound effects*”. This points to another potential issue in the tutorial design, which is the lack of auditory cues. Sometimes referred to as the modality effect, it means that learning is more effective when both auditory and visual cues are utilized. Studies have found that learning is enhanced when the learners are presented with auditory information in addition to the textual information on the screen (Woo, 2009). Notwithstanding the low level of knowledge retention, some participants wrote that they did benefit from the tutorial. For example, one participant mentioned: “*The tutorial answered some*

questions I have about finding references. New information is also learned on top of what I've known, such as the backward reference search and the forward reference search".

5.1.4 Intention to Use

Participants in affective EAs group were more likely to use the IL tutorial than those from the other two groups (H4). Though many studies have demonstrated the effectiveness of using affective EAs, to the best of our knowledge, this is one of the first to directly measure participants' intention to use an IL tutorial with affective EAs in the evaluation. Since intention to use has been found to be the single best predictor of actual system usage (Venkatesh et al., 2003), the findings indicate that the use of affective EAs can foster the concomitant potential for actual usage of an online IL tutorial with affective EAs.

The participants in the affective-EAs group were more motivated and derived more enjoyment, thus it is natural that they were more likely to use the IL tutorial. This finding is supported by participants' comments in affective-EAs group such as *"Learning such a tutorial would be useful to us"* and *"I can see how it is applicable to our studies"*. This contrasts with some negative feedback such as *"It could have been more engaging and interactive, rather than just lengthy words"* from the text-only group.

5.2 Investigation of User Acceptance

5.2.1 Influence of Motivation on Intention to Use

In terms of the influence of motivation on intention to use an IL tutorial with affective EAs, the findings show that relevance had a positive effect on intention to use an IL tutorial with affective EAs (H5b). This demonstrates that the provision of relevant knowledge in the IL tutorial positively influenced students' intention to use, and students were surprised that *"IL can be so relevant to our studies"*, and the knowledge *"will be useful for the future"*. The result is consistent with previous studies (Park, 2009; Venkatesh et al., 2003), which found relevance to be an important predictor of technology usage. In the context of this study, the result could

be explained by the deliberate tutorial design decisions. Compared to other IL tutorials focusing on teaching library specific knowledge (e.g. location of library collections, types of library services), a general model (i.e., the ISP Model) was used in our tutorial as an overarching structure, and some general information seeking strategies (e.g., keywords searching, forward chaining and backward chaining) were taught. This enabled students to relate their own information seeking process to this tutorial, despite their diverse educational backgrounds.

Further, confidence was identified as a significant predictor of intention to use an IL tutorial with affective EAs (H5c). Some participants found that “*it resonated with the steps I had done for other assignments and it reinforced it and gave me additional tips*”. As suggested by Doumanis and Smith (2013), the use of affective EAs positively impacted the perception of the difficulty level of the learning content, thus students felt more confident about the learning process. Prior research has also found that confidence can impact perceived self-efficacy, and thus increases intention to use (Venkatesh et al., 2003).

Another important finding is that satisfaction significantly predicted intention to use an IL tutorial with affective EAs (H5d). This shows that user satisfaction can directly predict intention to use (Liu, Chen, Sun, Wible, & Kuo, 2010). The reasons are not difficult to understand: the greater satisfaction that users get from the online tutorial, the stronger they would feel like using it. In this case, user satisfaction may come from the innovative use of affective EAs in teaching IL, as one participant commented that, “*The animations and illustrations made a rather dry topic slightly more interesting*”.

Surprisingly, attention was found to have a non-significant influence on intention to use an IL tutorial with affective EAs (H5a). We speculate that this demonstrates the pragmatism of students as they rated relevance over visual appeal when using online learning systems. For instance, one participant stressed the importance of relevance in the tutorial “*The materials have to be very relevant, or no matter or interesting the tutorial is, it is not useful*”.

5.2.2 *Influence of Enjoyment on Intention to Use*

In terms of the impact of enjoyment on intention to use an IL tutorial with affective EAs, affective (H6a) and behavioral enjoyment (H6c) were found to be significant predictors of students' intention to use the IL tutorial with affective EAs. This finding extends Wu and Liu's (2007) work which found that enjoyment was a significant predictor of intention to use educational systems, but provided a more nuanced perspective by closely examining the impact of three different dimensions of enjoyment on intention to use. We were surprised that participants even noticed the different dimensions of enjoyment, as one commented *"The content of this instructional program is a reflection of student's life therefore I watch it carefully. Besides that, I also enjoy the cognitive and affective messages from it"*.

The significant influence of affective enjoyment on intention to use an online IL tutorial with affective EAs confirms the importance of affect in online education (H6a). Findings from this study suggest that affective enjoyment had considerable impact on students' intention to use the IL tutorial with affective EAs. Moreover, this finding affirms the importance of creating an affective learning environment where emotional support and help are provided to alleviate frustration and anxiety in the learning process (Kolb & Kolb, 2005). In the context of this study, the affective learning environment was supported through the simulated conversation between the student and teacher, as well as the encouraging words from the teacher to reassure the student. This is reflected by participants' comments such as *"There were encouraging comments after each slide to reinforce a positive attitude in the student"*.

Moreover, behavioral enjoyment was found to be a significant predictor of intention to use an IL tutorial with affective EAs (H6c). This is probably because by watching the affective behaviors displayed by the affective EAs in the tutorial, participants developed rules to guide their own subsequent actions. Thus it is reasonable to believe that the behaviors of the EAs in the tutorial prompted participants to engage in learning. Additionally, although the main action needed for going through the IL tutorial is to read and click on to get to the next page, the positive results indicates that simple interaction styles may be all that is necessary when creating effective online tutorials (Klein, Moon, & Picard, 2002). For instance, participants commented that *"I like that it was rather interactive (there were pop ups and buttons to click etc.)"*. However, cognitive enjoyment was not significant in

predicting usage intention (H6b). The reason might be similar to that of confidence. The participants felt overloaded by the amount of IL knowledge provided in the tutorial. Thus an important lesson learnt in this study is that content should be appraised carefully for quantity.

6. CONCLUSION

This study is motivated by the importance of IL education for students, and the opportunities afforded by online education. Further, this study incorporated affective EAs into an IL tutorial to increase students' learning motivation and enjoyment, as well as to ease potential negative feelings during the information seeking process. Kuhlthau's (2004) ISP Model was utilized as a theoretical framework in the IL tutorial.

From a research perspective, this study affirms the effectiveness of using affective EAs to increase students' motivation and enjoyment in the IL tutorial. These empirical findings are important as they show how librarians can rethink library instruction programs to cater to the needs of students of this generation. Moreover, this study highlights the role of affect in the context of online education. The affective aspects of students' learning have been neglected in previous IL educational systems. This study shows that when affect is incorporated, students perceive such systems to be more motivational and more enjoyable. Therefore, it indicates that students indeed pay attention to the affective aspects in online learning. Relatedly, user acceptance of information systems is often considered as volitional and cognitive behavior, leaving the affective aspects on the periphery. This study brings affect into user acceptance studies, and finds that affective enjoyment has a positive impact on intention to use the information system.

In addition, the findings have implications for practitioners such as curriculum designers and library professionals. First, this study suggests a way to address the criticism of the lack of affect in online education by using affective EAs, thus aligning IL instruction with students' preferences. The learning environment created by the affective EAs was found to be motivational and enjoyable for students to learn IL, since it was an environment that they could readily engage in. Second, the IL tutorial was constructed from rudimentary elements of a graphical user interface, such as

dialog boxes, buttons, and text. This study showed that it is possible to create affective EAs without employing complicated technologies but still be effective, illustrated by the more favorable response in motivation and enjoyment by students in the affective EAs group. This has valuable implications to libraries without the resources for sophisticated software development.

Although the study has yielded valuable insights, there are several limitations that may reduce generalizability of the results. First, the topic in the IL tutorial was confined to storytelling in knowledge management, thus students from other educational backgrounds may not have been able to relate well to the content. Some participants may prefer topics from their own disciplines. Hence, future studies could incorporate other topics and domains, either general or library specific, to accommodate students with diverse backgrounds and interests. Second, the amount of IL knowledge in the tutorials was probably heavy for students, as indicated by the students' comments and laments. Future work should balance the amount of knowledge in the tutorial and avoid overloading students. Additionally, since the instrument used to measure knowledge retention was developed by the authors and used before rigorous testing, it may be weak in external validity. Lastly, intention to use was employed as a proxy for actual use of the IL tutorials with affective EAs, while there are still some discrepancies between the two. Therefore, we may gain more insights with a further evaluation of actual use of the IL tutorials. In spite of these limitations, the findings from this paper affirms the importance of affect in online education, and points to the promise of using affective EAs in increasing students' learning motivation and enjoyment in IL education.

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8. APPENDICES

8.1 Appendix A – Survey Items on Motivation

1. When I first looked at the instructional program, I had the impression that it would be easy for me.

2. There was something interesting at the beginning of the instructional program that got my attention.
3. The instructional program was more difficult to understand than I would like for it to be.
4. After reading the introductory information, I felt confident that I knew what I was supposed to learn from the instructional program.
5. Completing the instructional program gave me a satisfying feeling of accomplishment.
6. It is clear to me how the content of the instructional program is related to things I already know.
7. The instructional program had so much information that it was hard to pick out and remember the important points.
8. The interface design of the instructional program is eye-catching.
9. There were examples that showed me how the instructional program could be important to some people in the learning setting.
10. Completing the instructional program was important to me.
11. The quality of the writing in the instructional program helped to hold my attention.
12. The content of the instructional program is so abstract that it was hard to keep my attention on it.
13. As I watched the instructional program, I was confident that I could learn the content.
14. I enjoyed the instructional program so much that I would like to know more about this topic.
15. The design of the instructional program looks dry and unappealing.
16. The content of the instructional program is relevant to my interests.
17. The way the information is arranged in the instructional program helped keep my attention.
18. There are explanations or examples of how people use the knowledge in the instructional program.
19. The activities in the instructional program were too difficult.
20. The instructional program has things that stimulated my curiosity.
21. I really enjoyed learning with the instructional program.

22. The amount of repetition in the instructional program caused me to get bored sometimes.
23. The content and style of writing in the instructional program convey the impression that its content is worth knowing.
24. I learned some things that were surprising or unexpected with the instructional program.
25. After working on the instructional program for a while, I was confident that I would be able to pass a test on the content.
26. The instructional program was not relevant to my needs because I already knew most of it.
27. The wording of feedback, or of other comments in the instructional program, helped me feel rewarded for my effort.
28. The variety of reading passages, activities, illustrations, etc., helped keep my attention on the instructional program.
29. The style of writing in the instructional program is boring.
30. I could relate the content of the instructional program to things I have seen, done or thought about in my own life.
31. There are so many words on each instructional program screen/page that it is irritating.
32. I felt good to successfully complete the instructional program.
33. The content in the instructional program will be useful to me.
34. I could not really understand quite a bit of the material in the instructional program.
35. The good organization of the content in the instructional program helped me be confident that I would learn this material.
36. It was a pleasure to work on such a well-designed instructional program.

8.2 Appendix B – Survey Items on Enjoyment

1. I felt attracted to this instructional program.
2. I became less aware of my surroundings because I was engrossed in watching the instructional program.
3. I think this instructional program is a good way of learning information seeking skills.

4. I felt emotionally attached to the instructional program.
5. I think it is worthwhile to watch the instructional program.
6. I felt emotionally involved in the instructional program.
7. I think this instructional program is an interesting way of learning information seeking skills.
8. I lost track of time while using this instructional program.
9. I felt emotionally affected while watching this instructional program.
10. I was less self-aware while watching the instructional program.
11. I think this instructional program is an effective way of learning information seeking skills.
12. I was less worried about my life while watching the instructional program.

8.3 Appendix C – Survey Items on Knowledge Retention

1. How many different stages are there in typical academic information seeking process?
 - A. 4
 - B. 5
 - C. 6
 - D. 7
2. What are the typical information sources for academic information?
 - A. Scholarly journals
 - B. Newspaper
 - C. Electronic databases
 - D. Google Scholar
3. Citation is important in academic writing because:
 - A. It could avoid misinterpretation
 - B. Authors could be given proper credit
 - C. Your ideas are build upon prior works
 - D. Readers could trace the origins of ideas
4. After locating some useful articles, what should you do if you cannot find more information?
 - A. Discuss with friends/classmates/professors
 - B. Read the reference of those relevant articles

- C. Find out other articles by those authors
 - D. Use wildcard in search queries
5. The NTU Library tool bar can assist you to:
- A. Access full text of journal articles that are within NTU Libraries' subscription
 - B. Locate resources in NTU Libraries catalogue
 - C. Organize citations into required format
 - D. Follow libraries on social media
6. Name at least one conventional citation style
- _____.
7. Name at least one academic database
- _____.
8. Google Scholar could provide sufficient academic information.
- A. True
 - B. False
9. You could start writing the term project right after identifying the topic.
- A. True
 - B. False
10. Keyword searching is the single most important academic search technique.
- A. True
 - B. False
11. One of the added values of books is that they include an extensive bibliography.
- A. True
 - B. False
12. Normally you should do exhaustive searching on selected topic before starting the formal presentation/writing stage.
- A. True
 - B. False

13. It is wise to discuss the term projects with friends/classmates/professors in the early stages.

A. True

B. False