How people learn in an asynchronous online learning environment: The relationships between graduate students' learning strategies and learning satisfaction

Comment apprennent les gens dans un environnement d'apprentissage en ligne asynchrone : les relations entre les stratégies d'apprentissage des étudiants aux cycles supérieurs et la satisfaction liée à l'apprentissage

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Abstract

The purpose of this study was to examine the relationships between learners' learning strategies and learning satisfaction in an asynchronous online learning environment. In an attempt to shed some light on how people learn in an online learning environment, one hundred and sixteen graduate students who were taking online learning courses participated in this study. The result revealed that "metacognitive strategy" and "time and study environment" had positive correlations with learners' satisfaction, while "help seeking" had a negative correlation. The findings of a multiple regression analysis showed that "metacognitive strategy" and "peer learning" led to learners' satisfaction in an online learning environment. The findings of this study contribute to a better understanding of how successful learning occurs in an online learning environment, and provide recommendations on designing an effective online learning.

Résumé

L'objet de cette étude était d'examiner les relations entre les stratégies d'apprentissage des apprenants et la satisfaction liée à l'apprentissage dans un environnement asynchrone d'apprentissage en ligne, dans le but de faire la lumière sur les façons dont les gens apprennent dans un environnement d'apprentissage en ligne. Cent seize étudiants aux cycles supérieurs qui suivaient des cours en ligne ont pris part à cette étude. Les résultats ont révélé que la « stratégie métacognitive » et « le moment et l'environnement pour l'étude » avaient des corrélations positives avec la satisfaction des apprenants, alors que « demander de l'aide » avait une corrélation négative. Les conclusions d'une analyse de régression multiple ont démontré que la « stratégie métacognitive » et « l'apprentissage entre pairs » avaient des corrélations positives avec la satisfaction des apprenants dans un environnement d'apprentissage en ligne. Les conclusions de cette étude contribuent à une meilleure compréhension des façons dont un apprentissage

réussi se produit dans un environnement d'apprentissage en ligne et fournissent des recommandations sur la conception d'un apprentissage en ligne efficace.

Introduction

With a wide bandwidth Internet and various web technologies, online learning is increasingly booming in popularity as an innovative and/or alternative form of education (Broadbent & Poon, 2015; Means, Toyama, Murphy, Bakia, & Jones, 2010). In response, online courses and distance degree programs are now accepted as formal instructional methods across most accredited institutions. According to the Babson survey research group's report on the higher education online learning in the United States (Allen & Seaman, 2014; Means et. al, 2010), over 7.1 million students were taking at least one online course during the fall 2012 term, an increase of 411,000 students over the previous year. Furthermore, this survey reported that 33.5% of higher education students have now taken at least one course online. Interestingly enough, 74% of academic leaders rated the learning outcomes in online education as the same or superior to those in face-to-face course, and 65.9% of higher education institutions now said that online learning was a critical part of their long-term strategy (Allen & Seaman, 2014). It is thus not surprising that research on online learning is increasingly growing as one of the biggest research strands in the field of education.

Online learning environments are very distinctive instructional environments in which the learner and instructor are physically separated, but communications are mediated by online technologies. Given that, many researchers argue that the roles of learners and instructors may be transformed in the online environment (Baran, Correia, & Thompson, 2011; Comas-Quinn, 2011; Hung, Chou, Chen, & Own, 2010; Keengwe & Kidd, 2010). Keengwe and Kidd in particular argued that online learning instructors are largely considered to be facilitators, designers, and administrators rather than traditional lecturers or content deliverers. In addition, Hung et al. addressed that online learning environments required students to take a more active role in their learning since online learning gives students flexibility and empowerment over the course of their learning. Online learning environments, hence, rely profoundly on learners' learning dispositions such as their learning strategies, which promote self-regulated learning (Comas-Quinn, 2011). Promoting such qualities might be of paramount importance for successful learning in this environment. As such, how learning occurs in online learning environments can be better understood by uncovering what learning strategies significantly come into play while learning in this environment.

With its unique environmental attributes and the importance of learners' learning strategies in mind, self-regulation is instrumental in making learning possible in online learning environments. In this regard, many researchers have studied learners and self-regulated learning in online learning environments (Anderton, 2006; Castaño-Muñoz, Duart, & Sancho-Vinuesa, 2014; ChanLin, 2012; Chen, 2002; Vukman & Licardo, 2010; West, Rosser, Monani, & Gurak, 2006). By and large, those studies have examined which learning strategies became effective in pursuit of academic achievement in online learning environments. Yet suffice it to say that those findings cannot provide us with strong grounds to understand how successful learning occurs in online learning environments. Particularly, in order to identify and predict successful learning

and academic achievement in this environment in a more rigorous manner, there is a need for further study into the attributes that account for successful learning in online learning environments. In this respect, the author would argue that learning satisfaction could be a crucial attribute to account for successful learning in online learning environments. First and foremost, many studies have found plenty of evidence that learning satisfaction leads to academic achievement in various conditions such as instructional settings and age groups (Jung, Choi, Lim, & Leem, 2002; Lim, Kim, Chen, & Ryan, 2008; Zeegers, 2004). What's more, learning satisfaction is a human's inherent attribute, aroused by the relationship between learners and a learning environment (Lo, 2010).

Meanwhile, a variety of research on satisfaction in online learning environments has largely focused on environmental aspects and external conditions of learning, such as learners' attitudes toward online environments, learners' technology capability, course quality and flexibility, gender, maturity, and personal experiences in online learning (Arbaugh & Duray, 2002; Hong, 2002; Ke & Kwak, 2013; Kuo et al., 2013; Piccoli et al., 2001; Paechter et al., 2010; Sun et al., 2008), rather than learners' endogenous aspects of learning, such as learning strategies. There is, thus, still a dearth of research on online learning environments, with a focus on the learner's attribute.

This study explores in what ways learning strategies are used for successful learning in online learning environments. More precisely, this study examines how learners' learning strategies have to do with their learning satisfaction; in doing so, this study tries to unfold the prominent learning strategies that learners use for the success of their learning in the online learning environment. The results from this study provide a better understanding of how successful learning occurs in online learning environments, thereby contributing to the literature on the design and development of online learning. In terms of the online learning design, the majority of studies have been focusing on pedagogical perspectives (e.g., online discussion strategies and various presentation strategies, etc.) and environmental perspectives (e.g., graphic design and system usability, etc...). This study, however, attempts to unveil the learner's perspectives about online learning, such that educators and instructional designers can design more effective online learning by taking into account how learners, instructors, and environmental attributes interact together.

Detailed research questions are as follows:

- RQ1: What is the relationship between learning strategies and learners' learning satisfaction?
- RQ2: How can learners' learning strategies predict learning satisfaction in the online learning environment?

Learning Strategies and Online Learning Environments

Learning Strategies

There are effective and efficient learning strategies in accordance with a certain learning situation. Suppose, for instance, we are asked to memorize certain terms or concepts within a limited time. We may rely on rehearsal so that we can store and maintain this information in our

brain in an effective way. Although such learning strategies may vary according to the subjects, learning environments, and learners' preferences, it may appear obvious that learning strategies are the most proper attribute that accounts for the endogenous learner's characteristic in learning, as well as that explains how learners learn in certain learning situations. In this regard, Derry and Murphy (1986) define learning strategies as "the collection of mental tactics employed by individual in a particular learning situation to facilitate acquisition of knowledge or skill" (p. 2). Weinstein and Mayer (1986) also define learning strategies as "behavior and thoughts that a learner engages in during learning and that are intended to influence the learner's encoding process" (p. 315).

While it is widely assumed, in the traditional cognitive psychology tradition, that learning strategies rely primarily on self-regulatory processes—i.e., learning strategies are merely determined by individuals' cognitive processes—, there is another way to look at learning strategies as a socially-reciprocal process, which is influenced by environmental and behavioral events (Bandura, 1991; Zimmerman, 1989). Particularly Zimmerman, with a social cognitivist view, defines learning strategies as "actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners" (p. 329), aiming to improve one's self-regulation of their personal functioning and academic behavioral performance. Simply put, learning strategies are not just mental phenomenon, instead, "they are manifested overtly in some form during social and behavioral functioning" (p. 337).

There are a variety of learning strategies presented by many researchers. Weinstein and Underwood (1985) list four major classes of learning strategies: information processing, study, support, and metacognitive. Weinstein and Mayer (1986) categorize different learning strategies as rehearsal, elaborative, reorganizational, metacognitive and affective. According to Pintrich, Smith, Garcia and McKeachie (1993), learning strategies consist of three categories and nine subordinates. Colorado and Howell (2009) summarized a detailed description of each component as follows:

- "Rehearsal strategies, such as reciting or naming items from a list to be learned, are used for activation of information in working memory rather than the acquisition of new information in long-term memory" (p. 74).
- "Elaboration strategies allow the building of internal connections between items to be learned. Elaboration strategies include paraphrasing, summarizing, and creating analogies" (p. 74).
- "Organization strategies help learners select and construct connections between information items to be learned. Organization involves active processing and should result in increased performance" (p. 74).
- "Critical thinking refers to the level to which students report they apply previous knowledge to new situations in order to solve problems and reach decisions" (p. 74).
- "Metacognitive self-regulation refers to the awareness, knowledge and control of cognition. This includes planning, monitoring, and regulating activities" (p. 74).
- "The time and study environment variable refers to the degree to which students manage their time and set up a study environment conducive to learning" (p. 74).
- "Effort regulation refers to students' ability to control their effort and attention when faced with distractions and uninteresting tasks" (p. 74).

- "Peer learning refers to the degree to which a student will collaborate with peers" (p. 74).
- "Help seeking refers to a student's tendency to seek assistance from peers, instructors, or colleagues" (p. 74).

Weinstein and Underwood (1985) and Pintrich and Johnson (1990) asserted that learning strategies could be controlled by learners, and could be improved through instruction. These studies have suggested that educators assist students in understanding and mastering different learning strategies, in order to help them become better learners. In response, many researchers have become more interested in the research on learning strategies. The majority of studies, however, have paid too much attention to learning performance (see Table 1); that is, there is still a need for research on the learning strategies from various points of view.

Table 1

Preceding Research on Learning Strategies

Researcher	Learning strategies	Dependent variables	Situation
Loomis (2000)	Time management skill Information processing Test strategies	Learning performance	Undergraduate level of Online based research method class
Shih et al. (1998)	Memorization, elaboration, and organization	Learning achievement	Undergraduate level of Online based Zoology and Biology class
Puzziferro (2008)	Time and study environment, effort regulation	Learning performance (final grades)	Undergraduate level of Liberal art online course
Vukman and Licardo (2010)	Metacognitive self-regulation	Students' school-grades (GPA)	Traditional instruction ranged from elementary school to undergraduate
Warr and Downing (2000)	Rehearsal, Interpersonal Help-seeking, Emotion Control and Motivation Control	Knowledge acquisition	Adult technical trainees class
Liu et al. (2010)	Concept mapping	English reading comprehension	Undergraduate level of face to face freshmen English class
Rodriguez (2009)	Organizing study, time management, achieving	Problem solving skill, collaboration, GPA	Undergraduate business class
ChanLin (2012)	Time management, Information processing, Use of support, self-testing, test strategies	Students' project, final grades, online interaction	Undergraduate level of Online based Media Services course

Learning in Online Learning Environments

Learning in online environments is dependent largely upon the individual's ability to direct and manage the learning process. Learners in this environment are supposed to set goals and to implement appropriate methods for successful learning. In order for learners to attain a successful learning experience, they have to effectively manage both time and resources while learning in this environment. Jonassen et al. (1995) found that the necessity for self-regulation in online learning environments might be even more important than in the traditional environment, because of the less active role of the teacher. That is, online environments require learners to have an active attitude toward studying, rather than a passive absorption of knowledge from the instructor. Self-regulated learning thus plays a pivotal role in making learning happen in this environment.

Meanwhile, self-regulated learning refers to the motivational orientations and learning strategies that students employ to attain desired goals (Zimmerman, 1989). Zimmerman and Martinez-Pons (1986) summarized the process of self-regulated learning as "the degree to which students are metacognitively, motivationally, and behaviorally active participants in their own learning process" (p. 4). When it comes to online learning and self-regulation, Paechter, Maier and Macher (2010) found that self-regulation is highly correlated to learning achievement in online learning. Meanwhile, Kuo, Walker, Belland and Schroder (2013) addressed the importance of self-regulation in the online learning context, due in part to the fact that online learning environments require students to have more responsibilities over their learning than traditional classroom learning. By the same token, King, Harner, and Brown (2000) also stressed that self-regulated learning is more important in an online education context than the traditional context because of this additional responsibility from learners.

Methodology

Participants

One hundred and sixteen graduate students were recruited for participation in this study. Participants were all enrolled in a three-credit online course that was offered asynchronously from the college of education at the northwest U.S. university. Of the participants, forty-nine were female, and sixty-seven were male.

Instruments

Learning strategies. To examine participants' learning strategies, the Motivated Strategies for Learning Questionnaire (MSLQ) was employed. The MSLQ, developed by Pintrich and his colleagues (1991), is a self-report instrument that is designed to assess college students' motivational orientations and their use of different learning strategies. This 81-item instrument uses a 7-point Likert scale (1 = not at all true of me and 7 = very true of me) and consists of six motivation scales (31 items measuring value, expectancy, and affective component) and nine learning strategies (50 items measuring cognitive and metacognitive strategies, and resource management strategies). Given the focus of this study on emphasizing the learner's self-regulated learning strategies in the online learning environment, using the MSLQ instrument is a good way to collect student's different learning strategies in an online

learning, because it asks about individual learner's study habits, skills and motivation for learning, as they relate to a specific course. Of the various instruments for examining learning strategies, the MSLQ uses the socio-cognitive view of motivation and self-regulated learning as their theoretical framework. This theoretical framework is in line with the study's underlying framework, which emphasizes self-regulated learning due to the unique nature of online learning environments. The MSLQ subscales selected for this study (with their reported Cronbach's Alpha reliability coefficients) were cognitive (.89), metacognitive (.94), and resource management strategies (.93).

E-Learner Satisfaction (ELS). To measure e-learning satisfaction, the Electronic Learner Satisfaction (ELS) was employed. The ELS was developed by Wang (2003) and consists of 16 items, with the two global measures of perceived overall satisfaction and success of the e-learning system as criterion. The instrument uses a seven-point Likert scale (ranging from "strongly disagree" to "strongly agree"). The inter-item consistency of this questionnaire was .935 in Cronbach Alpha (α), which was determined to be highly reliable.

Procedure and Data Analysis

Data were collected via online survey at the end of semester. Participants were asked to fill in the above-mentioned self-reported questionnaires. After collecting data, data analysis began. To answer the research questions, the collected data were analyzed in the following ways: First, in order to examine the relationship between learning strategies and learners' satisfaction, a correlation analysis was performed, and second, a multiple regression analysis with stepwise selection was performed so as to identify which variables better predict learners' e-learning satisfaction.

Results

Relationship Between Learning Strategies and e-Learners' Satisfaction (ELS)

In order to examine the relationship between learning strategies and learning satisfaction, a correlation analysis was performed. The results of a correlation analysis are shown in Table 2, which shows that the variables of learning strategies, "metacognitive", "time and study environment", and "help seeking" were correlated with learning satisfaction. Specifically, metacognitive and time and study environment had a positive correlation with "e-learner satisfaction". The correlation coefficient between metacognitive and e-learner satisfaction was .950, and the coefficient between time and study environment and e-learner satisfaction was .908. Help seeking and e-learner satisfaction had a negative correlation (-.501).

Table 2

The Correlation Coefficient between ELS and Learning Strategies (n= 116)

	1	2	3	4	5	6	7	8	9	10
1. ELS	1									
2.Rehearsal	.061	1								
3. Elaboration	.105	.186	1							
4. Organization	.134	.831**	.156	1						
5. Critical Thinking	.176	-.095	.689**	-.120	1					
6. Metacognitive	.950**	.015	.131	.070	.341	1				
7. Time and study environment	.908**	-.007	.195	.011	.468	.962**	1			
8. Effort regulation	.159	-.704**	.204	-.353	.588*	.258	.323	1		
9. Peer learning	.095	.320	-.406	.389	-.835**	-.075	-.171	-.595*	1	
10. Help seeking	-.501**	.650**	.162	.627**	.137	-.426	-.374	-.257	-.101	1

* p < .05, ** p < .01

Influence of Learning Strategies on Learning Satisfaction

In order to find contributors to the prediction of learning satisfaction, a multiple regression analysis was performed with learning satisfaction as a dependent variable and nine learning strategies as independent variables. The independent variables were selected using a stepwise selection method. The results of the analysis, presented in Table 3, showed that the regression model predicted 91.9% of the total variation of learner satisfaction with the value of $F(2, 113) = 86.229$, the *p*-value < .0001 (see Table 3). However, this included the two variables of 'metacognitive' and 'peer learning', and excluded non-significant variables, which were 'rehearsal', 'organization', 'elaboration', 'critical thinking', 'time and study environment 'and 'help seeking'. Results of the analysis for learning strategies' contributions towards learner satisfaction and their statistical significance, as shown in Table 4, showed that independent variables significantly affecting learner satisfaction were 'metacognitive' ($t = 13.069$, $p < .0001$) and 'peer learning' ($t = 2.261$, $p = .042$). The predictive variables on learner satisfaction turned out to be, in order, 'metacognitive' ($\beta = .952$) and 'peer learning' ($\beta = .166$).

Table 3

Anova Table of Regression Model (n=116)

Source	df	Sum of Squares	Mean Square	F	p
Regression	2	2090.422	1045.211	86.229	.000
Residual	113	1370.803	12.131		
Total	115	3461.225			

Note. R^2(adj. R^2) = .930(.919)

Table 4

The Result of Multiple Regression Analysis on Learner Satisfaction (n = 116)

Variable	Unstandardized Coefficients		Standardized Coefficients	*t*	*p*
	B	Standard Error	Beta		
Constant	4.163	5.385		.773	.453
Metacognitive	.897	.069	.952	13.069	.000
Peer Learning	1.142	.505	.166	2.261	.042

Discussion and Conclusions

Online learning environments are very distinctive places where the learner and instructor are physically separated. In essence, learning in this environment largely hinges on learners' self-regulated learning strategies. Learning strategies are generally accepted as an integral part of how learning occurs depending on learners' dispositions. To explore these learning strategies in a scientific way may provide not only a better understanding of how people learn, but also significant information for designing an effective learning environment. In this regard, the present study attempted to discover in what ways learning strategies are used for successful learning in an online learning environment. In light of the results of this study, conclusions are broken down into three major points:

First, looking at the relationship between learning strategies and learning satisfaction, 'metacognitive strategy' and 'time and study environment' had a positive correlation with learners' satisfaction ($r =.95$, $p <.01$ and $r =.91$, $p <.01$, respectively), while 'help seeking' had a negative correlation ($r =-.50$, $p <.01$). Metacognitive strategy refers to the awareness, knowledge and control of cognition. Time and study environment strategy refers to the degree to which students manage their time and set up a study environment conducive to learning. These strategies have in common in the sense of characterizing as the ability to manage learning by self-effort. This result clearly shows that an online learning environment is the place where requires self-regulated learning. This finding supports the assertion by King et al. (2000) that learning in online environments rests on learners' self-regulation. More to the point, the finding specifically shows that when these learning strategies (i.e., 'metacognitive strategy' and 'time and study environment') are highly emphasized, it is more likely that learners feel satisfied with their learning. As such, online learning instructors and instructional designers need to explore the ways in which learners can make the most of 'metacognitive' and 'time and study environment' learning strategies in online learning, fully reflecting them in the design/development process and their instructional practice.

Second, cognitive learning strategies such as 'rehearsal', 'elaboration', 'organization', and 'critical thinking' did not have a significant correlation with satisfaction. A variety of previous research in relation to learning strategies in online learning has found that such cognitive strategies have a high impact on academic achievement (Weinstein & Mayer, 1986; Shih, 1998). And many of such studies attempted to make an argument in regard to successful

learning from such results. Yet as argued in this study, we need to rethink what it means by successful learning. This study posited that learning satisfaction could alternatively and more plausibly account for successful learning, as opposed to the learner's academic achievement. In terms of satisfaction with a certain learning environment, learners may be able to learn with satisfaction, provided that instructional structures (e.g., learning environments, activities, etc...) are suited to learning approaches. By the same token, the finding of the relationship between learning strategies and satisfaction echoes the congruence between learning strategies and instructional structure. To put it simply, metacognitive strategy, which is the ability to plan, monitor, and regulate learning, and the online learning environment, which is the place optimized for self-regulated learning, go hand in hand in the sense of the balance between 'structure' and 'approach'. The relationship between 'time and study environment' and 'satisfaction' could also be understood in the same manner.

Third, the findings of the multiple regression analysis showed that 'metacognitive strategy' and 'peer learning' led to learners' satisfaction in the online learning environment ($F(2, 13) = 86.229$, $p < .0001$, $R^2 = .919$). To promote successful online learning, we need to take into account how to promote learners' metacognition and peer learning while learning in this environment. In other words, learning contents and tasks dealt with in this environment should be presented in such ways that learners can plan, monitor and regulate such activities (i.e., metacognitively), and that should be organized to promote interaction among the learners, in the sense of peer learning. It is the instructional designer's job to ensure that learners can make the most of these strategies over the course of their learning. Instructional designers and online instructors, thus, need to consider these findings in their design process, optimizing the use of online learning environments to sustain learners' satisfaction. Not only that, now that this study found that 'metacognitive strategy' and 'peer learning' can predict learners' learning satisfaction, we need to come up with ideas of how to teach such learning strategies in the learning process. As Pinch and Johnson (1990) stated, learning strategies could be improved through instruction, such that educators should help learners understand the use of diverse learning strategies. A typical online course generally includes the introduction to the course with the information of how to use this learning environment; that said, in order for learners to intrinsically experience learning satisfaction in this environment, we also need to include various tasks and/or activities that encourage them to exploit such learning strategies in their learning process.

Despite the findings of this study, there are some limitations that should be considered, providing directions for future research. First, the learning platform used in this study was a text-based asynchronous online environment. To generalize the findings of this study, a further study needs to be done with various online learning platforms and approaches to ensure study consistency. Second, participants of this study were experienced learners in the online environment. If participants are not familiar with the online learning environment, results may differ. Other factors, such as technology competency, efficacy and the like, could have an impact on learners' satisfaction. As such, diverse variables should be considered in multilateral perspectives in future studies.

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