Towards an Empirical Development of Critical Value Factors of Online Learning Activities

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Abstract
Activities are at the center of human behavior. Extensive attention has been given in literature to the success and effectiveness of online learning programs. Value theory suggests that human perceived value is a critical construct in investigating what is important to individuals. However, very limited attention has been given in literature to the role of users' perceived value of learning activities in educational settings. Scholars suggest that additional studies on learning activities are needed in order to progress the current knowledge of the use of information systems in education. Therefore, this study investigated issues related to learners' perceived value by uncovering the critical value factors (CVFs) of online learning activities. Participants in this study included 209 graduate students attending an online learning program. This study extended the first phase done in a prior research to uncover the CVFs of online learning activities. Results of this research study produced five reliable CVFs: (a) Collaborative, Social, and Passive Learning Activities; (b) Formal Communication Activities; (c) Formal Learning Activities; (d) Logistic Activities; and (e) Printing Activities.

Keywords: Online learning, critical value factors, activity theory, learning activities, learners' perceptions, valuable learning activities, value of online learning systems.

Introduction
In the past several years, online learning programs have been taking central stage in higher educational institutions (Geri & Gefen, 2007). According to Hiltz and Turoff (2005), "online learning is a new social process that is beginning to act as a complete substitute for both distance learning and the traditional face-to-face class" (p. 60). The significant growth of online learning programs at higher educational institutions around the world remain at record high (Anastasiades, Vitalaki, & Gertzakis, in press; Littlejohn, Falconer, & McGill, in press; Shee & Wang, in press). However, dropout from online learning courses appears to remain a problem (Connolly, MacArthur, Stansfield, & McLellan, 2007; Levy, 2007; Xenos, Pierrakeas, & Pintelas, 2002). Moreover, increasing attention has been given in literature to the assessment of the effectiveness and success of such programs, while very little attention has been given to the learners' perceived value associated with this medium (Chiu, Hsu, Sun, Lin, & Sun, 2005; Geri & Gefen, 2007; Levy, 2006a). Therefore, this study attempted to investigate issues related to learners' perceived value by uncovering the critical value factors (CVFs) of online learning activities. CVFs are the factors that educational institutions should pay attention to in order to increase the learners' perceived value, which in turn may help reduce dropout in online learner courses.

Theoretical Background
Activities are at the center of human behavior (Fishbein & Ajzen, 1975). Hasan and Crawford (2003) noted that activities are actions and operations that people perform in order to achieve a

desired outcome. These actions and operations are mediated by tools, words, and/or cultural signs. Learning activities refer to the actions and operations that individuals perform in order to achieve a desired learning outcome mediated by educational tools (Lapre, Mukherjee, & VanWassenhove, 2000). Online learning activities are mediated by online learning tools (Lam, 2004). Grounding in activity theory, Levy (2006b) extended the conceptual map of general human activity to online learning activity. He defined online learning activity based on activity theory as "an educational procedure designed to stimulate learning by online experience utilizing online learning systems and tools" (p. 30). Figure 1 presents an illustration of the activity theory in the context of online learning.

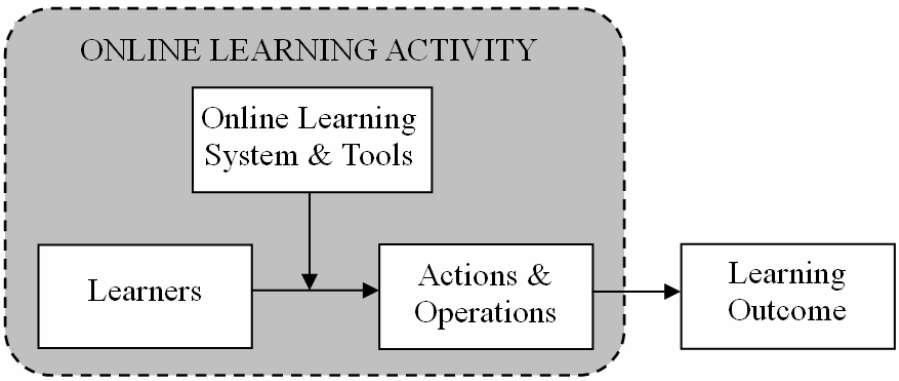

Figure 1. Activity theory in the context of online learning (Levy, 2006b)

A significant amount of research has been devoted over the last decade to the investigation of success of online learning (Alavi & Gallupe, 2003; Alavi & Leidner, 2001; Geri & Gefen, 2007; Hiltz & Turoff, 2005). Moreover, Chiu et al. (2005) noted that "some studies in the consumer behavior domain have also identified perceived value as an important determinant of user satisfaction" (p. 400). Yet the value associated with online learning has received very little attention in literature. The term *value* has been documented in literature with diverse definitions (Levy, 2006a). Based on the cognitive value theory, Rokeach (1969) argued that value refers to the individual's perceived "level of importance" (p. 161). According to Nulden and Scheepers (2002), additional research studies on learning activities are needed in order to progress the current knowledge on information systems use in education. Thus, this study proposes to address this need by seeking to uncover the CVFs of online learning activities grounded in activity theory and value theory.

Methodology

Instrument

This study extends the work done previously on the investigation of most valuable online learning activities (Levy, 2006b). This research phase takes the findings from the qualitative investigation done previously into a quantitative exploratory assessment of online learning activities to uncover the CVFs. The previous qualitative stage included the gathering and categorization of online learning activities using an open-ended questionnaire. The results of that initial phase produced a list of 51 activities that learners value during their online learning experience. Of these, six were eliminated prior to this phase of the study for lack of content and external validity. This phase, therefore, used a list of 45 online learning activities by assessing learners' perceived value attributed to each of the activities. Each learner was asked to rate his or her perceived value attributed to the online learning activities using a 6-point Likert-type scale from 'Not Important' to 'Extremely Important'. This value assessment scale was originally developed and validated by Levy (2006a).

Study Participants and Data Collection

The participants in this study were graduate students attending an online learning program at a major university in the southeastern United States. Data were collected between Spring 2006 and Spring 2007. About 600 students were solicited at the completion of the each term to voluntarily participate in the study. An e-mail message was sent to the students outlining the study and providing a link to the consent form as well as one to the Web-based survey. There were 214 responses, a response rate of about 36%. Prior to data analyses, it is recommended to explore the data for any irregularities (Mertler & Vannatta, 2001). Upon review of the data collected, five cases were eliminated from the final analysis due to an observed irregularity (response-set, outliers, etc.), providing 209 usable records, representing about a 35% response rate.

Data Analyses and Results

Table 1 provides the descriptive statistics and demographics of the data collected. Gender distribution is about 71% males and 29% females. Additionally, age appears to be normally distributed, ranging from 18 to 63 years old. The majority of participants in this study (67%) reported having extensive experience with online courses. Moreover, a large majority of the students participating in this study (over 83%) reported working full time or more.

Table 1. Descriptive Statistics and Demographics of Learners

Number of previous e-learning courses taken		
None, this was my first	21	10.0%
1	8	3.8%
2	9	4.3%
3	18	8.6%
4	13	6.2%
5 to 9	68	32.5%
10 or more	72	34.4%

Item	Frequency	Percentage (%)
Gender		
Male	149	71.3%
Female	60	28.7%
Age		
18 or under	1	0.5%
19-24	8	3.8%
25-29	31	14.8%
30-34	36	17.2%
35-39	49	23.4%
40-44	33	15.8%
45-54	40	19.1%
55-59	9	4.3%
60 or older	2	1.0%
Weekly hours for work/job		
No, I'm not working	9	4.3%
Less than 20	6	2.9%
20 to 29	4	1.9%
30 to 39	16	7.7%
40 to 49	113	54.1%
50 to 59	42	20.1%
60 or more	19	9.1%

In order to discover the CVFs, exploratory factor analysis was used. Mertler and Vannatta (2001) noted that in the process of exploratory factor analysis, new factors are discovered from the data. This study used Principal Component Analysis (PCA) to discover the CVFs. In order to determine

the reliability of the factors, two techniques were used. The first included a scree plot and eigenvalues analyses of the initial exploratory PCA analysis. Selection of the number of valid factors was done based on the scree plot curving point and the recommended eigenvalues level greater than one (Mertler & Vannatta, 2001). The results produced five reliable factors with cumulative variance of nearly 70%. The second technique used in the determination of factors reliability was based on 'Cronbach Alpha if deleted' analysis. This analysis seeks to examine the survey items that reduce the reliability of the resulting factors. Following this analysis, nine items were eliminated due to low contribution to the factors' validity and reliability. A secondary PCA analysis was done using the remaining 36 items. Appendix A provides the list of the items used and the CVFs resulting from this analysis. Additionally, the results of the secondary PCA analysis are presented in Figure 3. The results produced five CVFs: (a) Collaborative, Social, and Passive Learning Activities; (b) Formal Communication Activities; (c) Formal Learning Activities; (d) Logistic Activities; and (e) Printing Activities.

According to Kerlinger and Lee (1994), Cronbach Alpha of over .70 represents a reliable factor. Results of this study produced five factors with Cronbach Alpha of .836, .797, .848, .761, and .910 corresponding to the factors A through E respectively, indicating reliable factors.

		Component					Factor's Alpha
Item#	Factor	1	2	3	4	5	if item Deleted
A26	Collaborative, Social, and Passive Learning Activities	0.762831					0.837
A27		0.668098					0.842
A48		0.650156					0.850
A08		0.62844					0.850
A38		0.620318					0.855
A19		0.609754					0.858
A11		0.597744					0.848
A35		0.578775					0.847
A18		0.530789					0.857
A12		0.520988					0.852
A16	Formal Communication Activities		0.680631				0.756
A22			0.666783				0.767
A07			0.635989				0.773
A14			0.58816				0.763
A42			0.577751				0.787
A06			0.540825				0.786
A28			0.510556				0.793
A17			0.509988				0.785
A34			0.45024				0.785
A10	Formal Learning Activities			0.768757			0.807
A15				0.764494			0.814
A02				0.732311			0.818
A01				0.706016			0.836
A09				0.554658			0.828
A13				0.466229			0.842
A20				0.436946			0.845
A45	Logistic Activities				0.722958		0.703
A46					0.697394		0.708
A47					0.668566		0.717
A43					0.527168		0.740
A49					0.524063		0.747
A41					0.507784		0.741
A50					0.421351		0.760
A36	Printing Activities					0.892647	0.844
A37						0.868082	0.868
A30						0.827896	0.899

Varimax PCA Rotated Component Matrix (n=209)

Cronbach's Alpha --	0.863	0.797	0.848	0.761	0.910

Figure 3. Critical Value Factors of Online Learning Activities

The first factor, *Collaborative, Social, and Passive Learning Activities*, deals with online learning activities such as participating in live chat sessions, sharing files, exchanging e-mail with fellow classmates, reading course content online, and listening to course audios. The second factor, *Formal Communication Activities*, includes online learning activities such as reading formal communication from the instructor (via e-mail and discussion forums) and other formal activities. The third factor, *Formal Learning Activities*, deals with online learning activities such as replying to other students' posting to discussion forums, submitting assignments, and developing online personal profile (Website, blog, etc.). The fourth factor, *Logistic Activities*, refers to online learning activities such as downloading course syllabus and content, uploading assignments to storage site (for backup), and purchasing online course- or university-related items such as textbooks, software, and school memorabilia, clothing, etc. The last factor, *Printing Activities*, deals with online learning activities that relate specifically to printing including printing of the course syllabus, assignment guidelines, course documents, etc. The last factor is interesting as it includes three unique items with very high reliability. It appears that learners in the online learning medium put a very distinct value between the downloading of material and the actual printing process of that material. Eshet-Alkalai and Geri (2007) conducted a study on the comparison of two groups of learners on reading information via print and via digital format. The results of this study are consistent with those found by Eshet-Alkalai and Geri that for older learners, such as in this study, although downloading information is relevant in itself, they do still prefer to print the material and wish to have it in hard copy for review.

Discussion and Conclusions

Online learning has been widely adopted around the world as a valid medium for teaching in higher education. Online learning activities are at the center of the learning process in this medium. This study extended the first phase done in a prior research to uncover the CVFs of online learning activities. Results of this research study produced five reliable CVFs: (a) Collaborative, Social, and Passive Learning Activities; (b) Formal Communication Activities; (c) Formal Learning Activities; (d) Logistic Activities; and (e) Printing Activities. The results of this research can lead administrators and instructors of online learning programs to pay more attention to these factors. In consensus with prior literature, results of this work suggest that instructors of online learning courses should emphasize primarily the first three out of the five CVFs. Thus, instructors should emphasize students' learning by encouraging students to collaborate and participate in class-related social activities as well as via passive learning of the course content. Moreover, instructors should emphasize students' learning by facilitating formal communications that engage students in learning. Additionally, instructors should emphasize to students the formal learning activities such as participating in the discussion forums and submission of assignments. Instructor emphasis on these three factors should help reduce student frustration and may help reduce dropout from online learning courses.

There are several observed limitations for this study. The first is the use of a single institution for the data collected. Such limitation may reduce the external validity of the results and somewhat limit the generalization of the findings, although the sample for the study was adequate in terms of sample size. The second limitation of this study is the use of graduate students and the relatively older sample observed. The third limitation of the study is the high number of previously attended online learning courses for the sample collected. The majority of participants in this study demonstrated a high experience of five or more previously taken online learning courses.

Suggestions for future research are threefold. First, an examination of similar CVFs should be done with a larger sample, preferably with participants from diverse online learning programs. Second, another study may try to compare the findings based on age to see if younger students may attribute a significantly different set of CVFs. Lastly, additional work is needed to see if there is a relationship between the students' perceived score on the factors noted and their likelihood to drop out of online learning courses.

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Appendix A – List of the CVFs of Online Learning Activities

Item#	Item Description	Factor
A26	Participating in chat sessions (unofficial with other students)	Collaborative, Social, and Passive Learning Activities
A27	Sharing my assignments with the other students (via discussion forum)	
A48	Sharing my assignments with the other students (via e-mail)	
A08	Participating in chat sessions (official sessions with the professor)	
A38	Participating in live voice-chat sessions (i.e.- elluminate, PlaceWare, etc.)	
A19	Reviewing chapters slides online	
A11	Sending e-mails to other students	
A35	Reading other students' assignments (via discussion forum)	
A18	Listening to course's audios online	
A12	Reading e-mails from other students	
A16	Reading e-mails from the professor	Formal Communication Activities
A22	Reviewing professor's feedback on assignments (online)	
A07	Sending e-mails to the professor	
A14	Reading the professor's discussion forum messages	
A42	Reading information off the school's site	
A06	Checking grades online	
A28	Register for courses online	
A17	Reading assignments' guidelines online	
A34	Checking "myWebCT" for course(s)' updates	
A10	Replying to students' discussion forum messages	Formal Learning Activities
A15	Posting new discussion forum messages	
A02	Reading other students' discussion forum messages	
A01	Submitting course(s)' assignments online	
A09	Reviewing other students' personal websites	
A13	Developing personal website, profile, or blog	
A20	Replying to professor's discussion forum messages	
A45	Download course syllabus	Logistic Activities
A46	Download assignments' guidelines	
A47	Download chapters slides	
A43	Purchasing software for course(s) online	
A49	Upload assignments and course related files to an online storage site	
A41	Purchasing books, textbook and other course related literature online	
A50	Purchase school's memorabilia, clothing, etc. online	
A36	Printing assignments' guidelines	Printing Activities
A37	Printing other course documents (besides assignments)	
A30	Printing course syllabus	