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Conceptualizing Perceived Usefulness In E-Learning Context And Investigating Its Role In Improving Students' Academic Performance

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CONCEPTUALIZING PERCEIVED USEFULNESS IN E-LEARNING CONTEXT AND INVESTIGATING ITS ROLE IN IMPROVING STUDENTS' ACADEMIC PERFORMANCE

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Abstract

Most of the prior research on e-learning systems focused on the adoption of these systems. Two major research gaps in prior literature are weak conceptualization of perceived usefulness and ignorance of possible performance outcomes of using e-learning systems.

This paper conceptualizes perceived usefulness as a combination of perceived learning assistance and perceived community building assistance and proposes a research model for assessing the possible performance outcomes of e-learning systems utilization. The model was tested by collecting data from university students (n = 249) participating in hybrid courses using partial least squares (PLS) analysis.

The findings suggest that e-learning utilization, perceived learning assistance and perceived community building assistance are predicted by perceived task-technology fit. In turn, e-learning utilization, perceived learning assistance and perceived community building assistance predict students' perceived academic performance and satisfaction.

Keywords: Academic performance, E-learning, learning management systems, perceived learning assistance, perceived usefulness, satisfaction.

1 INTRODUCTION

Use of e-learning systems to support the processes of teaching and learning has become a very common phenomenon in the recent years (Islam, 2011; Sumak et al., 2011). In prior literature e-learning has been used as an umbrella term to describe teaching and learning activities using ICT (Islam, 2012). One type of e-learning system that has become very popular during the past decade is a learning management system (LMS).

The LMS, also known as course management system (CMS) or the virtual learning environment (VLE), is an e-learning system that has been widely adopted by universities (McGill & Klobas, 2009). The LMS is web-based software that is used for the delivery, tracking and managing of education and training online (Islam, 2011). It contains features for distributing courses over the Internet and online collaboration.

Since the late 1990s, the utilization of LMSs for online education has steadily increased in higher education. Nowadays, LMSs have become indispensable tools for online education. Whether focusing on distance education or class-room based education, most universities use LMSs to support and improve learning and teaching processes (Islam, 2012).

LMSs are usually implemented across an entire university, faculty, or school, and then adopted by educators who use them in a variety of ways to support course management and student learning (McGill & Klobas, 2009). The use of the LMSs in university education has made it easy to augment online education with traditional face-to-face classroom instruction. Such a hybrid or mixed delivery approach allows educators to combine the advantages of online learning with the benefits of face-to-face instruction (Edling, 2000).

There are some inconclusive findings regarding the role of e-learning for improving learning outcomes in prior literature. A mix of face-to-face (somewhere between 90% and 10%) and online instruction (somewhere between 10% and 90%) has been argued to be superior to either 100% face-to-face or 100% online courses (Woods et al., 2004). However, many studies have debated the appropriateness of e-learning in achieving better learning outcomes (Shih et al., 2008).

There has been much prior research focusing on the adoption and use of e-learning systems (Islam, 2011; Sumak et al., 2011). These studies considered the e-learning system usage intention as the dependent variable and investigated its antecedents or determinants. These studies overlooked the outcomes of e-learning system usage. In order to understand the impact of e-learning systems on students' learning outcomes and take potential advantage of the e-learning systems, research that investigates the influence of e-learning systems utilization on learning outcomes is needed.

Knowing the outcomes of e-learning system utilization is particularly important if we are to evaluate the success of such systems, plan for their future development and achieve better learning outcomes. Hence, this paper investigates the outcomes of e-learning system utilization for hybrid courses from the perspective of university students.

The paper proceeds as follows. In section 2 we present the literature review and theory development. Section 3 is dedicated to the research method and section 4 presents the data analysis results and discussion. Finally, section 5 discusses the implications.

2 LITERATURE REVIEW AND THEORY DEVELOPMENT

2.1 Performance improvement using e-learning

One of the major focuses of prior e-learning research has been the adoption and continued use of e-learning systems (Islam, 2011; Sumak et al., 2011). This research stream has mainly used two theoretical frameworks: the technology acceptance model (TAM) (Davis, 1989) and the expectation-confirmation model (ECM) (Bhattacherjee, 2001) in order to investigate individuals' e-learning system adoption and continued use. These two theories are often extended by other complementary theories such as IS success model (Islam, 2011), task-technology fit (Larsen et al., 2009) and theory of planned behavior (Liao et al., 2007).

Most prior studies mainly investigated the factors that affect the adoption and use of e-learning systems, but they do not consider how these factors, or the use of the e-learning system itself is associated with learning outcomes. Indeed, few studies have gone beyond use to explore the factors associated with learning. For example, McGill & Klobas (2009) found that e-learning system utilization influences the perceived impact on learning. Lee & Lee (2008) revealed that a number of e-learning environment quality related variables affect satisfaction with e-learning. In turn, satisfaction was found to influence academic achievement. Liaw (2008) found high correlation between intention to use e-learning and e-learning effectiveness. These studies provide some empirical support about the possible relationships between e-learning system use and e-learning system usage outcomes. However, Islam (2012) argued that most of these studies have been conducted with a variety of outcome variables that use different explanatory variables and this has led to models that offer only weak theoretical support. Hence, he called for more research on investigating e-learning system usage outcomes.

2.2 Conceptualizing perceived usefulness

Perceived usefulness is an indicator of the degree to which the use of an IS will enhance a user's job performance (Davis, 1989). Most of the prior studies in e-learning adoption modeled perceived usefulness as a black-box focusing on an overall benefit of an e-learning system (Larsen et al., 2009). The measures of perceived usefulness were mostly adapted from the TAM. Shee & Wang (2008) argued that e-learning systems are distinct from other information systems to some extent. They argued that an e-learning system offers educators and students "possibilities", instead of "ready to use" resources. In this regard, while the effectiveness of a general information system is based on the performance of individuals, an e-learning system's effectiveness largely depends on collaboration between individuals (both educators and students). As such, the prior conceptualization of perceived usefulness fails to capture the unique characteristics of e-learning. Hence, a better conceptualization of perceived usefulness in the e-learning context is necessary.

Based on above discussion, we conceptualize perceived usefulness with two constructs: perceived learning assistance and perceived community building assistance. Perceived learning assistance refers to the extent to which the e-learning system assists an individual's learning. Perceived community building assistance refers to the extent to which the e-learning system assists individuals in building a social community.

Our conceptualization of perceived usefulness in two parts is consistent with prior research. For example, Johnson et al. (2008) suggested that a particular e-learning system can provide value in at least two ways. First, the e-learning system can be useful because it helps the students manage and control their learning process. Second, the e-learning system can be useful because it contains many features that help the participants collaborate with each other.

2.3 Hypotheses development

We fill the two research gaps mentioned in section 2.1 and 2.2 in this study. To fill the first research gap we investigate the relationship between e-learning system utilization and outcome variables (e.g., perceived academic performance and satisfaction). Satisfaction is included as an outcome as it has been argued as a major outcome variable in several established theory like the IS success model (DeLone & McLean, 2003) and task-technology fit (Goodhue & Thompson, 1995). We adopt perceived academic performance as another performance outcome variable in this study as it has been argued as one of the most important construct for assessing students' performance in prior literature (Johnson et al., 2008; Islam, 2012; Lee & Lee, 2008). To fill the second research gap, we break perceived usefulness into two parts: perceived learning assistance, and perceived community building assistance. The research model is shown in Figure 1.

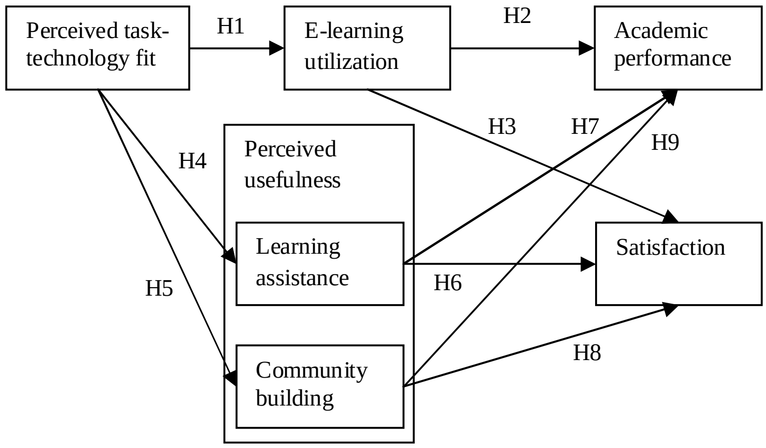

Figure 1. Research model

According to task-technology fit theory, if the requirement of tasks matches with the available technology, then most likely, users will use the technology to perform the tasks (Goodhue & Thompson, 1995). If students believe that the e-learning system they use fits the way they would like to study, they are more likely to use the system in the courses for reading and downloading learning materials and interacting with other participants (participating in the discussions, chatting, emailing, etc.). The association between perceived task-technology fit and e-learning system utilization has been verified by Larsen et al. (2009). Thus, we hypothesize the following.

H1. Perceived task-technology fit positively influences students' e-learning system utilization.

Goodhue & Thompson (1995) argue that the degree of task-technology fit is a major factor in explaining job performance levels. The positive scenario is that the more a technology meets specific work task characteristics, the higher is the probability that the technology will contribute to an improved job performance (Larsen et al., 2009). It implies that students' e-learning system utilization may improve academic performance. This statement is in line by the IS success model as well (DeLone & McLean, 2003). According to this model, IS usgae influences net benefits (a performance outcome related variable). Many prior studies confirmed this relation in different contexts including e-learning (Chen, 2010; Peter et al., 2009). Thus, we suggest the next hypothesis.

H2. E-learning system utilization positively influences students' academic performance.

The relationship between use and satisfaction has been ambiguous in prior literature. DeLone & McLean (1992) suggested that use and satisfaction are closely related variables and specified a bi-directional link between them. Later, DeLone & McLean (2003) specified that use behavior positively influences satisfaction. However, the literature based on the expectation-confirmation theory (Oliver, 1980) views that satisfaction influences use behavior. We argue that users build their satisfaction with a system after using the system for some time. Hence, it is more logical that e-learning utilization influences satisfaction. In fact, many prior studies found a positive causal relation from utlization to satisfaction in different contexts including e-learning (Balaban et al., 2013; Peter et al., 2009). Following this, we prefer DeLone & McLean's (2003) interpretation in this paper and hypothesize the following.

H3. E-learning system utilization positively influences students' satisfaction.

Larsen et al. (2009) proposed a direct relation between perceived task-technology fit and perceived usefulness. TAM 2 also proposes a relation between perceived compatibility (a similar construct to perceived task-technology fit), and perceived usefulness (Venkatesh & Davis, 2000). Based on these, we propose the following two hypotheses.

H4. Perceived task-technology fit positively influences students' perceived learning assistance.

H5. Perceived task-technology fit positively influences students' perceived community building assistance.

Although, students and educators are physically separated in an e-learning environment, it has been argued that students' engagement is greatly increased in such a learning environment (Northrup, 2001). Increased student engagement can improve learning outcomes, such as problem solving and critical thinking skills (Liaw et al., 2007). Individuals are assumed to learn better when they discover things by themselves and when they control the pace of learning (Leinder & Jarvenpaa, 1995). These results imply that the use of e-learning systems in the courses provides some sort of self-directed learning opportunities which lead to the improvement of learning effectiveness among the students.

The studies built upon social network theory argue that students interact more effectively when a social structure enables them to access a larger base of contacts and makes the exchange of information faster (Cho et al., 2007; Ortiz et al., 2004). Fast receipt of information may assist learning. For example, educators can upload learning materials in advance so that the students can read them before going to class. This may allow them to learn effectively in classroom situations. Consequently, the students remain satisfied and get an opportunity to improve their academic performance. Altogether, it is plausible to assume that the learning assistance offered by the e-learning systems may improve students' satisfaction and academic performance. Thus, we propose the following hypotheses.

H6. Students' perceived learning assistance positively influences their satisfaction.

H7. Students' perceived learning assistance positively influences their perceived academic performance.

Studies suggest that an effectively designed and administered online course environment can assist in the creation of a social environment (Wang & Kang, 2006). We further argue that such social interaction will create a social network. For example, face-to-face meetings among educators and students should help to build a supportive social network. Additionally, online activities should provide students with the opportunity to become better acquainted and share their common interests about a particular topic more deeply. It may even be that many students become more active in the online social medium of instruction in comparison with face-to-face situations. In fact, some students may prefer to participate more in online discussions rather than face-to-face. In brief, active online discussions conducted by students may allow them to create a network with both educators and other students. Based on these arguments, we propose the following hypotheses.

H8. Students' perceived community building assistance positively influences their satisfaction.

H9. Students' perceived community building assistance positively influences their perceived academic performance.

3 STUDY DESIGN AND METHOD

3.1 Questionnaire development

The questionnaire had three parts: demographic questions, questions related to the constructs of the research model, and open ended questions asking to report the students' satisfaction and dissatisfaction with the target system. In general, the questionnaire was designed to collect students' perceptions regarding their past Moodle usage experience in courses.

Each item corresponding to the constructs has been measured using the seven-point Likert scale, the answer choices range from "Strongly disagree (1)" to "Strongly agree (7)". Most of these items are adapted from the literature with minor changes in wording reflecting the target system. The measures of perceived task-technology fit and e-learning system use were adapted from Larsen et al. (2009) and Sun et al. (2009) respectively. Tthe measures of perceived academic performance and satisfaction were adapted from Lee & Lee (2008) and Bhattacherjee (2001) respectively. The items of perceived learning assistance were developed from Liaw's (2008) e-learning effectiveness measures. The items of perceived community building assistance were developed from Paechter et al.'s (2010) interaction measures. Two judges sorted the items of these two constructs into two categories based on the similarities and differences. The categories made by the two judges fully matched with each other.

After the questionnaire was drafted, it was first sent to two academic researchers for their review and revised according to their comments and suggestions to make the wording of the items more precise. Then, the questionnaire was sent to 10 students for their review. Overall, the students indicated that the questionnaire was relatively clear and easy to complete. A number of suggestions were made concerning the wording of several items and the overall structure of the questionnaire. The questionnaire was revised according to the given suggestions. In order to avoid the common method bias problem as much as possible, we decided to randomize the questions in the questionnaire during data collection Straub et al. (2004).

3.2 Target system and participants

The target system of this study is the learning management system, Moodle (http://moodle.org/about/). Moodle is an open source course management system and has become very popular among educators for creating dynamic online course websites for students. Moodle can be used to conduct online courses or to augment face-to-face courses (hybrid courses).

This study was conducted in an internationally acknowledged, multidisciplinary scientific university in Finland. The university has seven faculties. The university has been using Moodle since 2007 as its platform for creating course pages online. Data was collected via a web-based survey from the students of the university who use Moodle in hybrid courses. A list of students' email addresses was collected from the Moodle support team in the university. A total of 1100 email invitations were sent to randomly selected students of the university who had been registered in Moodle as student users. One reminder was sent to increase the response rate after a gap of one week. The survey ran for approximately two weeks. After filtering invalid and incomplete responses, we had a total of 249 survey responses that could be used in this study. The demographic information of the respondents is given in Table 1.

		Frequency	**Percentage**
Gender	Male	101	40.56
	Female	148	59.44
Age	less than 21 years	31	12.45
	21-30 years	166	66.67
	31-40 years	25	10.04
	>41 years	27	10.84
Experience with the target system	0 – 6 months	15	6.02
	>6 months – 1 year	63	25.30
	>1 year – 1 year 6 months	10	4.02
	>1 year 6 months – 2 years	47	18.88
	>2 years – 2 years 6 months	9	3.61
	>2 years 6 months – 3 years	27	10.84
	>3 years	78	31.33

Table 1. Demographic information

3.3 Data analysis

To analyze the quantitative data, we employed partial least squares (PLS) as our analysis approach and utilized the tool smartPLS (Ringle et al., 2005). PLS is a second generation regression method that combines confirmatory factor analysis with linear regression, and this makes it possible to run the measurement and structural models simultaneously. The qualitative data was content analyzed and used to support the findings of the PLS model.

Table 2 shows item wise averages and the loadings of each construct in the model. For each construct the assessment of convergent validity or internal consistency is also included through the composite reliability coefficient (Fornell & Larcker, 1981). Convergent validity indicates the extent to which the items of a scale that are theoretically related are also related in reality. As we can see from Table 2, all items have significant path loadings greater than the threshold 0.7 recommended Fornell & Larcker (1981). All the constructs have composite reliability values that exceed the threshold recommended by Nunnally (1978).

Construct	Item	Mean	std	Loading
Perceived task-technology fit (CR = 0.95 ; AVE = 0.85)	PTTF-1: Moodle is compatible with most aspects of my study	5.18	1.25	0.90*
	PTTF-2: Using Moodle fits with my study style	4.85	1.30	0.94*
	PTTF-3: Using Moodle fits with the way I like to study	5.10	1.19	0.95*
Satisfaction (CR = 0.95 ; AVE = 0.85)	SAT-1: My overall experience of using Moodle is absolutely delighted	4.87	1.55	0.90*
	SAT-2: My overall experience of using Moodle is very contented	4.75	1.66	0.91*
	SAT-3: My overall experience of using Moodle is very pleased	4.67	1.45	0.94*
	SAT-4: My overall experience of using Moodle is very satisfied	4.49	1.45	0.95*
Perceived learning assistance (CR = 0.93; AVE = 0.76)	PLA-1: Moodle provides flexibility of learning with regard to time and place	5.67	1.38	0.81*
	PLA-2: Moodle assists learning performance	4.84	1.37	0.93*
	PLA-3: Moodle assists learning efficiency	4.76	1.46	0.92*
	PLA-4: Moodle assists learning motivation	4.31	1.54	0.83*
Perceived community building assistance (CR = 0.89; AVE = 0.72)	PCB-1: Moodle provides opportunities to establish personal contact with teachers	3.97	1.76	0.82*
	PCB-2: Moodle makes it easy to do group work	3.88	1.57	0.88*
	PCB-3: Moodle provides opportunities to establish new contacts with other students	3.35	1.57	0.85*
Perceived academic performance (CR = 0.91; AVE = 0.83)	PAP-1: I anticipate good grades in such courses where Moodle is used heavily	3.98	1.35	0.91*
	PAP-2: I anticipate better grades in such courses where some of the in-class activities are replaced by Moodle (online) activities	3.83	1.49	0.91*
E-learning system utilization (CR = 0.96; AVE = 0.92)	USE-1: I will use Moodle frequently in this academic period	4.82	1.65	0.96*
	USE-2: I will use Moodle heavily during my study	4.20	1.58	0.96*

Note: Composite reliability (CR), Average Variance Extracted (AVE), *p < 0.001

Table 2. Construct items, means and internal consistencies

Testing for discriminant validity involves checking whether the items measure the construct in question or other (related) constructs. Discriminant validity was verified with both correlation analysis and factor analysis as recommended by Gefen & Straub (2005). First, the inspection of discriminant validity among variables is based on the correlation between variables and the square root of their respective average variance extracted (Fornell & Larcker, 1981). As Table 3 shows, the square root of the average variance extracted value for the variables is consistently greater than the off-diagonal correlation values, suggesting satisfactory discriminant validity between the variables. Second, from Table 4 we see that all items have cross loadings coefficients lower than the factor loading on their respective assigned latent variable, suggesting that discriminant validity on the item level is met for all the constructs.

	(1)	(2)	(3)	(4)	(5)	(6)
Perceived academic performance (1)	**0.91**					
Perceived learning assistance (2)	0.68	**0.87**				
Perceived task-technology fit (3)	0.65	0.70	**0.92**			
Satisfaction (4)	0.53	0.65	0.70	**0.92**		
Perceived community building assistance (5)	0.53	0.60	0.53	0.50	**0.85**	
E-learning system utilization (6)	0.49	0.60	0.69	0.65	0.40	**0.96**

Table 3. Correlation among variables and squared root of average variance extracted

	Perceived academic performance	**Perceived learning assistance**	**Satisfaction**	**Perceived task-technology fit**	**Perceived community building assistance**	**E-learning system utilization**
PAP-1	**0.912770**	0.624931	0.446025	0.546658	0.518300	0.516976
PAP-2	**0.907730**	0.608428	0.373496	0.419792	0.448734	0.380810
PLA-1	0.506225	**0.811703**	0.558073	0.648265	0.477433	0.537861
PLA-2	0.602032	**0.929225**	0.521947	0.594350	0.519992	0.529865
PLA-3	0.604235	**0.920721**	0.501885	0.615953	0.478445	0.521858
PLA-4	0.646899	**0.827863**	0.427086	0.520408	0.597071	0.509509
SAT-1	0.406143	0.526706	**0.895389**	0.619708	0.375455	0.567165
SAT-2	0.309029	0.420433	**0.807054**	0.503426	0.230550	0.446315
SAT-3	0.405754	0.501233	**0.936624**	0.582400	0.295034	0.543351
SAT-4	0.443497	0.546963	**0.946356**	0.569808	0.355136	0.518067
PTTF-1	0.485582	0.629898	0.577446	**0.899696**	0.413334	0.624178
PTTF-2	0.483359	0.591721	0.602227	**0.940331**	0.402224	0.645901
PTTF-3	0.421122	0.556769	0.531375	**0.948663**	0.351760	0.570731
PCB-1	0.385782	0.440082	0.212962	0.359335	**0.819031**	0.343828
PCB-2	0.509855	0.581021	0.415652	0.448503	**0.875997**	0.379125
PCB-3	0.448347	0.480850	0.274310	0.317311	**0.852910**	0.300786
USE-1	0.503266	0.577935	0.563957	0.672974	0.380150	**0.956699**
USE-2	0.442622	0.571949	0.578858	0.673771	0.392885	**0.957184**

Table 4. Factor analysis results

4 RESULTS AND DISCUSSIONS

The test of the structural model includes estimates of the path coefficients, which indicates the strengths of the relationships between the dependent and independent variables, and the R-square values, which represent the amount of variance explained by the independent variables. Figure 2 shows the results of the test of the hypothesized model.

All of the proposed hypotheses are supported in this study. Looking at the results, we find three interesting findings.

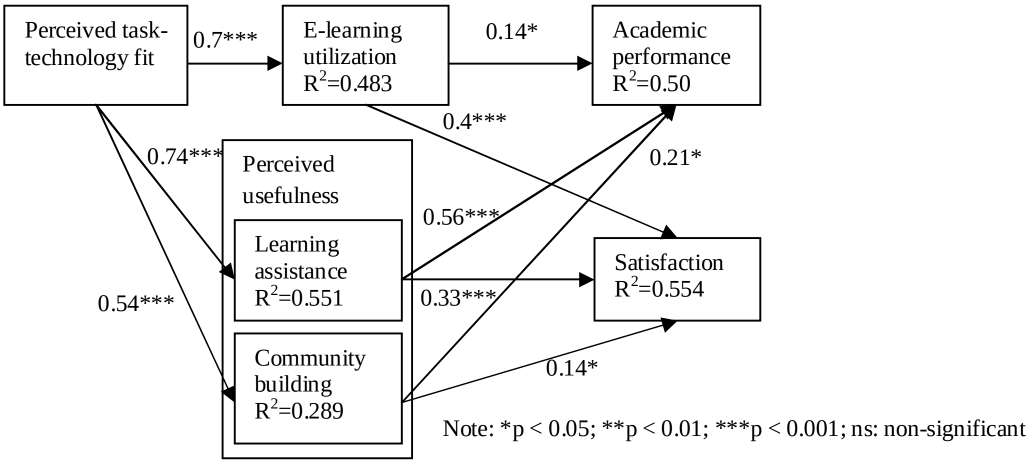

Figure 2. PLS model results

First, our study results revealed that perceived task-technology fit strongly influences e-learning system utilization, perceived learning assistance and perceived community building. The finding regarding the relation between perceived task-technology fit and e-learning utilization is in line with prior literature. For example, Larsen et al. (2009) found a strong relationship between perceived task-technology fit and e-learning utilization. The other two relationships were not tested in prior literature. However, some evidences can be drawn from prior literature in support to these new findings.

Empirically, user adoption has been linked to other research that uses variables similar to perceived task-technology fit, for example, job-relevance (Venkatesh & Davis, 2000), cognitive fit (Vessey, 1991), and perceived compatibility (Moore & Benbasat, 1991). User adoption research often found a significant relationship between perceived compatibility and perceived usefulness (Sun et al., 2009; Venkatesh & Davis, 2000). Our finding implies that if the e-learning platform is compatible with the study, it is most likely that the students will feel the system useful and use it. Conversely, if the e-learning platform provides important functionalities with a user-friendly interface, but does not provide the functionalities that are needed for the completion of their study, they are unlikely to feel the system useful and will not use the system.

Second, we found that e-learning utilization, perceived learning assistance, and perceived community building have strong influences on perceived academic performance. Neither of these relationships was tested empirically in prior literature. However, the findings of prior studies provide indirect support to our results.

Utilization of an IS has often been linked to performance improvement (DeLone & McLean, 2003). As a result, we expect that e-learning utilization would help students improve their academic performance. However, it is interesting to see that the influence of e-learning utilization on perceived academic performance is very weak while the influences of perceived learning assistance and perceived community building are very strong. The interpretation of this finding is that the extensive use of e-learning system does not necessarily bring benefits to students. Hence e-learning systems should be used in such a way that can help to learn and increase collaboration. Such effective utilization largely depends on an educator's capabilities to build an effective learning environment with the students. The answers to the open ended survey questions provide further support to this. For example, one student wrote the following:

"*….All teachers do not know how to use Moodle, some teachers know but they don't take the full advantage of Moodle….*"

Another student wrote the following:

"*….Moodle sites work best when the teachers put timely and valuable information there….*"

Another student wrote the following:

"*….I have the feeling that teachers do not really want us to take full advantage of Moodle. For example, the teachers do not really encourage us to use discussion forums. In addition they do not allow us to put external links to the Moodle page which could be important for learning….*"

Finally, our study revealed that e-learning utilization, perceived learning assistance, and perceived community building assistance have significant influences on satisfaction. The relationship between e-learning utilization and satisfaction is supported by the IS success model (DeLone & McLean, 2003). The other two relationships were not tested in prior literature. However, some findings can be drawn from prior literature in support to our findings.

Johnson et al. (2008) conceptualized course performance, course satisfaction and course instrumentality as the measures of e-learning effectiveness. They concluded that perceived usefulness has a significant impact on both course performance and course satisfaction. The answers to the open ended survey questions provide further support to this. For example, one student wrote the following:

"*….I am very happy because I get all the information in one place despite the fact that I missed a lecture….*"

Another student wrote the following:

"*….Once we had excellent discussion in the discussion forum. It helped us to learn many new things….*"

5 CONCLUSIONS

Our study findings have two major theoretical implications. First, while most prior studies only investigated the adoption and use of e-learning systems, our study went beyond e-learning utilization and provided insights into the outcomes of e-learning system utilization.

Second, while prior research viewed perceived usefulness as a black-box, we have broken it in two parts namely perceived learning assistance and perceived community building assistance. We also have explored how these variables relate to satisfaction and perceived academic performance. Overall, our findings suggest that perceived learning assistance is the most important variable in predicting satisfaction and perceived academic performance.

Our study findings have practical implications for e-learning system designers, educators, and school management. First, the study found that perceived learning assistance and perceived community building have significant influences on both academic performance and satisfaction. This implies that designers need to develop e-learning systems that provide students learning assistance and community building assistance. We especially suggest designers put more effort on improving the system's learning assistance. Improving learning assistance requires a closer look on whether the system fits with the way the students study. A good fit is expected to improve community building assistance and e-learning utilization as well. Educators can also play a major role in relation to this. We suggest educators to put effort into designing courses utilizing e-learning systems so that the students are able to learn effectively. They should add different functionalities to the course pages and encourage the students to use them. For example, educators may put functionalities in the course pages depending on the type of courses, and students' learning style in order to improve students' perceived task-technology fit.

Second, we found that more utilization may not necessarily improve students' academic performance to a great extent. Hence, an education institute's management needs to know how to ensure users' effective usage of e-learning systems. Improving students' and educators' knowledge about the e-learning systems should lead to the effective usage of such systems. If they do not have much knowledge of these systems, they are less likely to use them or they may not be able to gain the full benefits of such systems, which may result in ineffective online collaboration. In turn, ineffective collaboration may negatively impact on student learning. Therefore, schools and universities should provide training for both students and educators on how to use their particular e-learning systems most effectively.

Our study has a number of limitations. First, the research was cross-sectional. The beliefs of the users regarding a system will change as the users gain experience of a target system but such changes cannot be captured with the type of cross-sectional study undertaken. Second, the study has been conducted using a single e-learning platform in a single Finnish university. Thus, cautious should be taken before generalizing the findings to other contexts. Third, we did not test moderating effects in this study. There might be several moderating variables such as gender, voluntariness, and type of courses. Future studies should test the moderating effects of these variables on the proposed relationships.

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