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Exploring the Community of Inquiry model: Students' attitudes towards e-learning

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E-learning is the use of information and communications technologies to support teaching and learning. This study sought to determine students' attitudes toward e-learning as it is used at The University of the West Indies, St. Augustine, Trinidad and Tobago. Garrison's (2000) Community of Inquiry model was used to evaluate how students viewed teaching presence, cognitive presence and social presence impacting on their satisfaction and learning outcomes. This research used a mixed-methods approach and used factor analysis, structured equation modelling and thematic content analysis. The findings indicate a statistically significant relationship between the dependent and independent variables in three hypotheses relating to satisfaction and two hypotheses relating to learning.

Key words: E-learning, Community of Inquiry, student learning, satisfaction

Introduction

E-learning is the use of information and communications technologies to support teaching and learning. Over the past two decades advances in technology have encouraged educators to explore alternatives to the traditional in-class method of teaching, including approaches that are heavily supported by various information and communication technologies. As a result, there has been an upsurge in two forms of e-learning: pure online learning, that is, "learning that completely uses the internet" (Kaur, Fadzil & Abas, 2010, p.1) and blended learning – a combination of traditional in-class learning and online learning (Downes, 2008). This phenomenon is the continuation of distance education movements that arose to serve communities that were too remote to access higher level education (Hinkle, 2009) and to offer education to more persons at a lower cost (McIsaac & Gunawardena, 1996, p.2). Today, many institutions use some form of e-learning and Allen and Seaman (2007) report that, by 2006, 3.5 million students were participating in online learning at tertiary institutions in the United States.

Governments, academics and university administrators in the developing world, though beset by technical, administrative and resource challenges, have started to embrace the blended and e-learning concepts (Mahmud, 2010, p.150), and have strived to deploy systems in their local contexts. Across the African continent there is a growing interest in using learning management systems and social media so as to reach underserved communities and to improve learning outcomes (Isaacs, Hollow, Akoh & Harper-Merrett, 2013). Further, Hogan and

Kedrayate (2010, p.6) report on ChemOnline, an innovative first year chemistry course deployed by The University of the South Pacific.

At The University of the West Indies (UWI), St. Augustine (STA), e-learning, as an accompaniment to traditional classroom learning, began in 2001. Given that pure online learning is managed by the University's Open Campus, e-learning activities at STA can be categorised as blended, ie. online activity used to complement traditional face-to-face classes. As of February, 2012, 3608 courses had the option to use myeLearning, the University's learning management system. Of these, 889 courses had content. UWI STA spends approximately TT$608,000 to TT$898,000 each year in supporting e-learning activities and views e-learning as a strategic enabler of the University's mission to educate people of the Caribbean in general and in particular, the citizens of the non-campus territories (UWI, 2012). As such, this is an opportune time to review student attitudes towards e-learning as it is anticipated that they will be the primary beneficiaries of these initiatives. Garrison's (2009) Community of Inquiry model was chosen as the theoretical lens for this study as it has been extensively tested and reviewed. This study thus focuses on students' perceptions of the impact of social presence, cognitive presence and teaching presence on their perceived mastery of course knowledge and their satisfaction with the e-learning experience overall.

Literature review

This study uses the Community of Inquiry (COI) model developed by Garrison, Anderson and Archer (2000). The COI model was developed to study the impact of online and blended learning on students primarily enrolled in tertiary level institutions. A community of inquiry refers to "the environment created by teachers and students where meaningful learning is facilitated by three defined elements: cognitive presence, social presence, and teaching presence" (Kovalik & Hosler, 2010, p.381). These categories, as highlighted in Figure 1, are indispensable to an academic community of inquiry as they positively or negatively impact on the quality of the educational experience and learning outcomes.

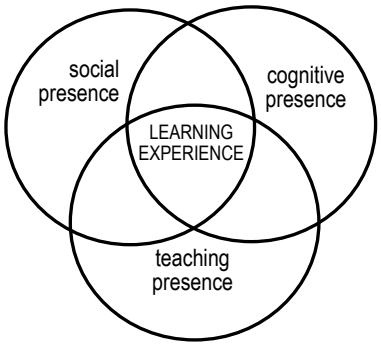

Figure 1. The Community of Inquiry model (Garrison, Anderson & Archer, 2000)

Social presence is "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities" (Garrison, 2009, p.352). Social presence comprises three dimensions: affective expression, open communication and group cohesion. Affective expression is concerned with expressions of emotions and feelings. Open communication deals with "reciprocal and respectful exchanges" (Garrison, Anderson & Archer, 2000, p.100). Group cohesion refers to "activities that build and sustain a sense of group commitment" (Garrison, Anderson & Archer 2000, p.101). Here, an individual should feel a sense of belonging. Social presence contributes to the success of the educational experience because students stay for the duration of the programme when they think it is necessary for their group interaction to be personally fulfilling (Garrison, Anderson & Archer, 2000).

Picciano (2002, p.28) discovered a strong correlation between "student perceptions of their interaction…and their perceptions of the quality and quantity of their learning" and further research has indicated that perceptions of social presence are linked to perceived and actual learning from them (Gunawardena, 1995; Picciano, 2002; Richardson & Swan, 2003) and to student satisfaction in online courses (Gunawardena & Zittle, 1997; Tu, 2002; Richardson & Swan, 2003). Thus, the following hypotheses were derived:

- *H1ai: Higher levels of perceived affective expression lead to greater levels of course satisfaction on the part of the respondent.*
- *H1aii: Higher levels of perceived affective expression lead to greater levels of perceived learning on the part of the respondent.*
- *H1bi: Higher levels of perceived open communication lead to greater levels of course satisfaction on the part of the respondent.*
- *H1bii: Higher levels of perceived open communication lead to greater levels of perceived learning on the part of the respondent.*
- *H1ci: Higher levels of perceived group cohesion lead to greater levels of course satisfaction on the part of the respondent.*
- *H1cii: Higher levels of perceived group cohesion lead to greater levels of perceived learning on the part of the respondent.*

Teaching presence is the "design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson, Rourke, Archer, & Garrison, 2001, p.5). Teaching presence comprises three parts: instructional design and organisation, facilitating discourse, and direct instruction. Instructional design and organisation is concerned with how a course is structured and organised for student interaction and learning (Anderson et al. 2001; Arbaugh, 2008). Facilitating discourse refers to "the means by which students are engaged

in interacting about and building upon the information provided in the course instructional materials" (Garrison & Arbaugh, 2007, p.164). Direct instruction concerns the instructor's intellectual guidance to the students (Anderson et al. 2001; Arbaugh, 2008). Studies have shown that it is of paramount importance for instructors to guide discussions in a way that activates deep thinking and promotes learning (Garrison & Cleveland-Innes, 2005).

Shea, Pickett and Pelz (2003) found that teaching presence is largely correlated with learning and student satisfaction. Students experienced high levels of learning and satisfaction in courses that exhibited high degrees of instructional design. With respect to facilitation and direct instruction, the students' perceptions of teacher presence correlated more highly with learning and satisfaction than did their perceptions of their peers' behaviours. Moreover, in a study focused on students' perceived performance and satisfaction in hybrid courses, Babb, Stewart and Johnson (2010) found that course design and delivery impacted on student performance and satisfaction. Hence, the hypotheses:

- *H2ai: Higher levels of perceived design and organisation lead to greater levels of course satisfaction on the part of the respondent.*
- *H2aii: Higher levels of perceived design and organisation lead to greater levels of perceived learning on the part of the respondent.*
- *H2bi: Higher levels of perceived facilitation of dialogue lead to greater levels of course satisfaction on the part of the respondent.*
- *H2bii: Higher levels of perceived facilitation of dialogue lead to greater levels of perceived learning on the part of the respondent.*
- *H2ci: Higher levels of perceived direct instruction lead to greater levels of course satisfaction on the part of the respondent.*
- *H2cii: Higher levels of perceived direct instruction lead to greater levels of perceived learning on the part of the respondent.*

Cognitive presence is the "extent to which learners are able to construct and confirm meaning" (Garrison, Anderson & Archer 2001, p.12). Cognitive presence comprises four parts: triggering event/revelation, exploration, integration, and resolution. Triggering event/revelation refers to "an issue, dilemma, or problem that emerges from experience is identified or recognized" (op cit p.11). Exploration deals with reflection of the individual and the social exploration of ideas (Garrison, Cleveland-Innes & Fung, 2004). Integration refers to the "construction of meaning from ideas found during the exploratory phase" (Garrison, Anderson and Archer, 2001, p.11). Lastly, resolution deals with solving an issue through the means of explicit action. In an educational setting, students solve problems through experimentation and thought sharing. Akyol and Garrison's (2011) mixed-methods study focusing on learning approaches and outcomes associated with online and blended communities of inquiry found that cognitive presence was associated with perceived and actual learning outcomes.

Thus, we derive the hypotheses:

- *H3ai: Higher levels of perceived revelation (triggering event) lead to greater levels of course satisfaction on the part of the respondent.*
- *H3aii: Higher levels of perceived revelation (triggering event) lead to greater levels of perceived learning on the part of the respondent.*
- *H3bi: Higher levels of perceived exploration lead to greater levels of course satisfaction on the part of the respondent.*
- *H3bii: Higher levels of perceived exploration lead to greater levels of course satisfaction on the part of the respondent.*
- *H3ci: Higher levels of perceived integration lead to greater levels of course satisfaction and perceived learning on the part of the respondent.*
- *H3cii: Higher levels of perceived integration lead to greater levels of course satisfaction and perceived learning on the part of the respondent.*
- *H3di: Higher levels of perceived resolution lead to greater levels of course satisfaction on the part of the respondent.*
- *H3dii: Higher levels of perceived resolution lead to greater levels of perceived learning on the part of the respondent.*

The proposed model

This model is used to illustrate the study's hypotheses and to show whether or not the dimensions of teaching, social and cognitive presence impact on learning and satisfaction at UWI STA.

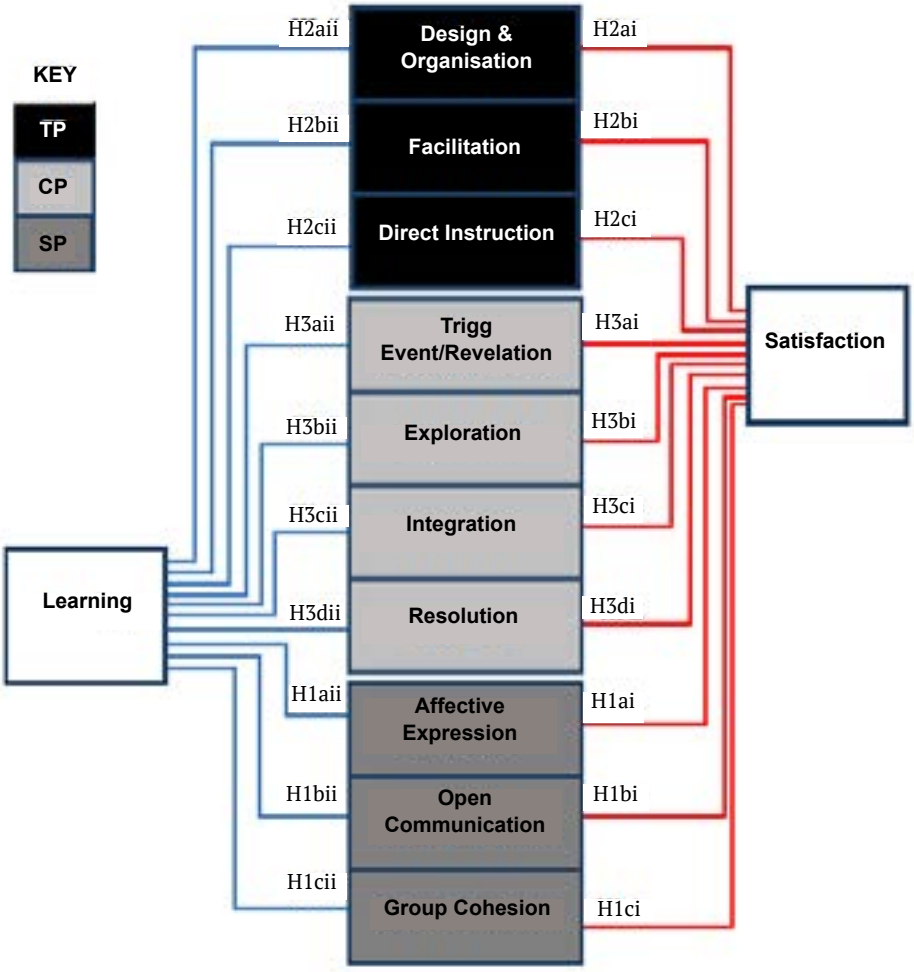

Figure 2. The proposed model (decomposed)

Methodology

This project was a mixed-methods study designed to evaluate quantitative and qualitative issues. Quantitative data was captured using an online survey instrument. Qualitative data was collected using face-to-face interviews and one open ended question in the survey instrument. Factor analysis and structured equation modelling were used to analyse the quantitative data and thematic content analysis used to analyse the data collected in the open ended question and from the interviews.

Quantitative research

The population consisted of undergraduate students of UWI STA who were enrolled in four compulsory courses during January to May, 2011. These courses included FOUN 1101 Caribbean Civilization, FOUN 1001 English for Academic Purposes, FOUN 1210 Science Medicine and Technology, and FOUN 1102 Academic Writing for Different Disciplines. A survey was sent via email to 2,708 students. By the end of the survey period, 376 students had responded at a response rate of 14%. Using a 95% confidence level, and a confidence interval of +/- 5%, a sample size of 335 persons was deemed to be appropriate.

The instrument consisted of simple demographic data and a combination of questions from three validated questionnaires by Alavi (1994), Wang (2003) and Garrison, Anderson and Archer (2000). The initial instrument was pre-tested to ensure the appropriateness, ease of understanding and relevance to the research. Likert scales were used for 46 statements/questions and were coded 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree and 5-Strongly Agree. These statements/questions included:

- The instructor/tutor clearly communicated important course topics;
- I felt comfortable disagreeing with other course participants while still maintaining a sense of trust, and
- Using e-learning increased my ability to critically analyse issues

The data was tested for missing data and outliers. Thereafter, the questions were factor analysed. These factor scores were Design and Organization, Facilitation, Direct Instruction, Triggering Event, Exploration, Integration, Resolution, Affective Expression, Open Communication and Group Cohesion. The factor scores were tested for normality, linearity and homoscedasticity. Once these assumptions were met, the proposed model was tested via Structural Equation Modelling using AMOS.

Qualitative research

The interviews were conducted with 12 participants from the four compulsory courses using convenience sampling. The participants were students who were enrolled in compulsory courses that utilised e-learning at UWI STA during Semester 2 of the Academic Year 2010/11. In addition to the interviews, the online survey instrument contained one open-ended question that also provided qualitative data. Content analysis was performed on the responses in order to understand the information. Interviews occurred on campus and were conducted outside of classrooms at the end of the class period so that students did not feel compelled to answer in a particular way due to the presence of the lecturer. Data collection for the open-ended question occurred online. With respect to the interview and the open-ended questionnaire question, a qualitative approach was used in order

to obtain further insight into students' perceptions of e-learning at UWI STA. This approach allowed for the acquisition of extended knowledge and understanding, concerning how students felt about all the aspects of e-learning.

The interview questions focused on the students' perceptions of e-learning. The participants were encouraged to describe their experiences and perceptions of e-learning as well as their perceived advantages, disadvantages and recommendations of the e-learning system. The interviews lasted between 15 minutes and 30 minutes. With respect to the open-ended questions, responses were downloaded from the online survey system. Thematic content analysis, as described by Newell and Burnard (2006) was used, to derive key themes from the interview and open-ended question responses.

Data analysis

Quantitative data analysis

Of the 376 responses collected, five cases had missing data for several questions and were deleted from the data set. One case was deleted from the data set as it appeared that the respondent simply chose one answer (1-Strongly disagree) for the entire questionnaire. In addition, one case was deleted because, of the 53 questions, 27 of them were answered with 1-Strongly disagree in a row. The means for the variables were close in value ranging from 3.11 to 3.91 indicating that the participants were all in some form of agreement with the questions in the survey. The median and mode for the variables were either 3 or 4. The standard deviation ranged from .716 to 1.059. The range, minimum and maximum were 4, 1 and 5, respectively for all individual questions.

The correlation matrix in this study contained values of .3 or more for all the questions linked to a specific factor. The questions under a specific factor were all correlated with each other After determining the factor loadings for each variable, factor scores were computed, having at least 60% of variance extracted and then tested for reliability. Table 1 shows the factors and their related reliability and extracted variance. With respect to measurement reliability, from Table 1, one can see the Cronbach alpha and standardised Cronbach alpha are well above the acceptable level of .60. The factor scores were deemed to be valid as they were all uni-dimensional in nature. When testing the multivariate assumptions (see Table 2) it was found that all of the variables fell within the range of +/-1, except Exploration – Kurtosis 1.106. This, however, was very close to 1 and was left unchanged. An evaluation of the histograms indicated that the variables were normally distributed and that their respective curves were bell shaped. All the independent variables were plotted against the dependent variables in various scatter plots and found to be linear as the cluster of points was approximately the same width throughout. The dependent variables exhibited equal levels of variance across independent variables. The points on the scatter plots examined were random and un-patterned, indicating homogeneity of variance.

Table 1. Results of factor analysis

Scale	No. of Items	Cronbach Alpha	CB Std	% of Variances Extracted
Design & Oganisation	4	.854	.856	66.9
Facilitation	6	.905	.905	68.0
Direct Instruction	3	.791	.790	70.5
Affective Express	3	.549	.550	53.3
Open Comm	3	.779	.781	69.6
Group Cohesion	3	.725	.731	62.2
Triggering Event	3	.821	.820	73.5
Exploration	3	.720	.725	64.6
Integration	3	.773	.773	68.8
Resolution	3	.784	.785	70.2
Learning	8	.925	.926	65.9
Satisfaction	4	.846	.846	68.6

Table 2. Testing normality via skew and kurtosis

VARIABLE	SKEW	KURTOSIS
Design & Oganisation	-.690	.686
Facilitation	-.253	-.294
Direct Instruction	-.345	-.392
Affective Express	-.111	-.167
Open Communication	-.166	.025
Group Cohesion	.006	.632
Triggering Event	.530	.204
Exploration	-.696	1.106
Integration	-.275	-.065
Resolution	-.523	.366
Learning	-.245	.095
Satisfaction	-.486	-.017

The proposed model revisited

The proposed model was tested using Structural Equation Modelling (Maximum Likelihood Estimation) in AMOS. All insignificant links (p-value more than .05) were removed. Further, additional links were added using AMOS' Modification Indices. Table 3 shows the Unstandardised Regression Weights/Estimates. The highlighted linkages are those which were not hypothesised but added to the model after data analysis. These linkages are discussed in the results and discussion section.

Table 3. Unstandardised Regression Weights

		Correlation	Estimate	S.E.	C.R.	P	Label
OpenCom	<----	Facilitation	.430	.047	9.144	***	par_13
Resolution	<----	Facilitation	.540	.044	12.214	***	par_8
AffExpress	<----	OpenComm	.474	.045	10.488	***	par_10
AffExpress	<----	Facilitation	.249	.045	5.514	***	par_15
Resolution	<----	OpenComm	.186	.044	4.203	***	par_18
Explore	<----	Resolution	.376	.045	8.395	***	par_9
Explore	<----	AffExpress	.213	.050	4.269	***	par_14
Explore	<----	OpenComm	.199	.051	3.864	***	par_20
DirectInstruct	<----	Facilitation	.651	.038	17.285	***	par_6
DirectInstruct	<----	Explore	.131	.038	3.442	***	par_17
DirectInstruct	<----	AffExpress	.122	.039	2.907	.004	par_22
Learning	<----	Explore	.237	.055	4.282	***	par_2
Learning	<----	Resolution	.183	.053	3.438	***	par_3
Learning	<----	OpenComm	.252	.051	4.927	***	par_4
GrpCohesion	<----	OpenComm	.501	.048	10.363	***	par_7
DesandOrg	<----	Facilitation	.529	.052	10.098	***	par_11
GrpCohesion	<----	Resolution	.182	.042	4.328	***	par_16
DesandOrg	<----	DirectInstruct	.273	.053	5.181	***	par_19
GrpCohesion	<----	AffExpress	.134	.047	2.855	.004	par_21
TriggEvent	<----	Explore	.433	.043	10.041	***	par_24
TriggEvent	<----	Facilitation	.218	.046	4.718	***	par_26
TriggEvent	<----	Resolution	.213	.050	4.290	***	par_28
Satisfaction	<----	DirectInstruct	.191	.046	4.156	***	par_1
Satisfaction	<----	GrpCohesion	.102	.046	2.211	.027	par_5
Satisfaction	<----	Learning	.456	.045	10.075	***	par_12
Integration	<----	Explore	.403	.047	8.575	***	par_23
Integration	<----	DesandOrg	.195	.040	4.929	***	par_25
Integration	<----	Resolution	.154	.047	3.295	***	par_27
Integration	<----	GrpCohesion	.089	.039	2.271	.023	par_29
Integration	<----	TriggEvent	.129	.049	2.643	.008	par_30

Table 4 shows that all the fit indices for the model are within acceptable margins with 36 degrees of freedom.

Table 4. Fit indices

Measure	Accepted Value	Actual Value
Chi Square	A low chi square relative to degrees of freedom with a *p* value more than .05 (p>0.05)	36.485
Goodness of Fit (GFI)	>0.90	.983
Adjusted Goodness of Fit (AGFI)	>0.90	.964
Normed Fit Index (NFI)	>0.95	.984
Root Mean Square Error of Approximation (RMSEA)	<0.05	.006

The following decisions were made with regard to accepting or failing to accept the null hypotheses of this study. The accepted hypotheses are all significant at the .05 level (see Table 5).

Table 5. Hypothesis testing

Hypothesis	Variable	Correlation Coefficient	Critical Ratio	Probabilities	Fail to Accept H0?
H1ai	Affective Expression	-	-	-	No
H1aii	Affective Expression	-	-	-	No
H1bi	Open Communication	.252	4.927	***	Yes
H1bii:	Open Communication	-	-	-	No
H1ci	Group Cohesion	-	-	-	No
H1cii	Group Cohesion	.102	2.211	.027	Yes
H2ai	Design and Organisation	-	-	-	No
H2aii	Design and Organisation	-	-	-	No
H2bi	Facilitation	-	-	-	No
H2bii	Facilitation	-	-	-	No
H2ci	Direct Instruction	-	-	-	No
H2cii	Direct Instruction	.191	4.156	***	Yes
H3ai	Triggering Event	-	-	-	No
H3aii	Triggering Event	-	-	-	No
H3bi	Exploration	.237	4.282	***	Yes
H3bii	Exploration	-	-	-	No
H3ci	Integration	-	-	-	No
H3cii	Integration	-	-	-	No
H3di	Resolution	.183	3.438	***	Yes
H3dii	Resolution	-	-	-	No

Several additional links that were not hypothesised were introduced into the model. They are all statistically significant at a p-value of .05. These additions are however supported by the literature and discussed below. Due to the large sample size, small r-squared values are deemed significant in this model. Table 6 shows the r-squared value for each variable.

Table 6. Squared multiple correlations

Variable	Estimate
Facilitation	.000
Open Communication	.185
Affective Expression	.388
Resolution	.413
Exploration	.399
Direct Instruction	.610
Triggering Event	.520
Learning	.295
Group Cohesion	.474
Design and Organisation	.573
Integration	.568
Satisfaction	.356

With respect to Learning, 29% of variance in Learning is accounted for by the predictor variables while 36% of variance in Satisfaction is accounted for by the predictor variables. A study conducted by Arbaugh (2008) revealed that 54% of the variance in student perceived learning and 22% of the variance in delivery medium satisfaction was accounted for by the COI model. Another study on hybrid learning, conducted by Babb, Stewart and Johnson (2010), found that their model which included some elements of the Community of Inquiry model, accounted for 17% of the variance in student satisfaction and 18% of their performance. The results from this study's model seem be relatively strong with 29% and 36% of variance accounted for by the model.

Qualitative data analysis

Six themes relating to the students' perceptions of e-learning were explored: teaching presence; social presence; cognitive presence; learning and satisfaction; problems concerning e-learning, and blended learning.

Teaching presence

Ten of the 12 students felt that lecturers did not sufficiently use e-learning. Notes and slides were often uploaded late and lecturers oftentimes failed to respond to

questions. In some cases, lecturers did not use the official e-learning platform, but instead used sites like Yahoo, Gmail and Facebook. The respondents felt that the lecturers "need to be trained in using e-learning and need to be better motivated". The same sentiments were voiced by students who responded to the open-ended online.

Social presence

There were mixed reviews concerning social presence online. Some students felt comfortable interacting online. One student stated that "e-learning provides an opportunity to make new contacts since you can interact with students online". On the other hand, some students were not comfortable interacting online and preferred face-to-face interaction. One student said that there was the "chance of other students looking down at you or making fun of you for answering questions wrongly or asking what they consider to be dumb questions". Further, ten out of 12 of the students stated that that there was no discussion aspect of their e-learning. Most of the students responding to the open-ended question from the questionnaire also claimed that most of their courses had no discussion forum.

Cognitive presence

Students generally had positive insights with regard to the cognitive aspect of e-learning. One student stated that "e-learning has helped me understand course topics to some extent. There are online activities that are not available in class that has helped me learn". The students generally found the course slides to be easy to understand and found that they guided their studying and helped to keep them up-to-date with the course.

Learning and satisfaction

Students generally felt that e-learning helped them to learn. They found that when used, it provided them with a good study guide for exams. One student said that, "E-learning has allowed me to learn at a pace suitable to myself as it provides a way for me to revise topics that I may not have understood during lectures". One student stated that "e-learning is the way forward in this modern era of education". Responses concerning satisfaction were mixed. Students enjoyed the accessibility to lecture notes and slides, the ease of use, being able to submit and save assignments online as well as the convenience of the system. While some students were satisfied with the system, many felt that it was highly under-utilised and inefficient. One student even said, "If it was not for a grade, I would not use it".

Problems concerning e-learning

Many of the students who answered the open-ended question from the questionnaire felt that e-learning was inefficient. One student said, "I think that too much emphasis is placed on e-learning and less on interaction with students". Many students also found that there was no online discussion and that e-learning

seemed to be very static. Many students cited e-learning downtime as a huge disadvantage. They claimed that when accessing the site during early morning hours, especially during exams, the site is unavailable. Several students also found the site to be intimidating since they were not computer savvy. One student said that "E-learning is too complicated. There are too many steps involved to get to one point. They should make it simple".

Blended learning

Most students said they preferred blended learning to fully online or traditional face to face formats. One student said "E-learning is basic. Sometimes one might interpret course material differently…need to speak with lecturer to find meaning". Another said, "E-learning compliments the traditional learning system". Most students found that e-learning is a good supplementary tool to classroom learning. One student said, "I could not complete my student life without e-learning". One student, however, did not like e-learning and preferred face-to-face classes as she found it better to discuss ideas in class. The respondent said, "One can see facial expressions and hear tone. It is better for clarity. Online communication can easily be misinterpreted since there are no social cues". On the other hand, another student preferred to use e-learning solely because he found lecturers to be quite intimidating.

Results and discussion

Direct instruction was found to be weakly but positively correlated (.191) with learning. Although this is a weak correlation, it suggests that, where available, students feel the need to be guided by their lecturers in their course of learning. Students tend to perceive teaching presence as the most significant measure of satisfaction (Wanstreet & Stein, 2006) and learning (Shea, Li, Swan & Pickett, 2005). Also, open communication was weakly but positively correlated (.252) with satisfaction. This indicates that, when used, discussion, without criticism, improves student satisfaction. To some extent this supports the Community of Inquiry model proposed by Garrison et al (2000).

Group cohesion was weakly and positively correlated (.102) with learning. This indicates that students enjoy feeling a sense of group presence, and belonging online and this, in turn, aids in their learning process. Studies have shown that perceptions of social presence are linked to perceived and actual learning from them (Gunawardena, 1995; Picciano, 2002; Richardson & Swan, 2003) and to student satisfaction in online courses (Gunawardena & Zittle, 1997; Tu, 2002; Richardson & Swan, 2003). However, this study shows that only one dimension of social presence is linked to learning and another dimension is linked to satisfaction.

Exploration was weakly and positively correlated (.237) with satisfaction. This indicates that students are satisfied when they actively assess the content they have encountered. Resolution was also weakly and positively correlated (.183) with satisfaction. This reveals that students are content when they can

solve problems and make sense of what they learnt.

In terms of explanatory power, the model accounted for 29% of the variance in learning and 36% of the variance in satisfaction. Not all the dimensions of each presence correlated to both learning and satisfaction. However, the dimensions did correlate among one another. This suggests that while not all the dimensions directly impact upon learning or satisfaction, they indirectly impact upon learning and satisfaction due to their links with other dimensions. According to the results of both the quantitative and qualitative analysis, it seems as though, where efficiently used (with social, teaching and cognitive presence), the e-learning system can be a successful supplementary educational tool at UWI STA as it lends to both student learning and satisfaction.

Other findings

Relationships were found between variables that were not hypothesised in this study. These findings are consistent with literature that reports these variables to be interrelated and support each other in the learning experience in the Community of Inquiry Model (Garrison, Anderson & Archer, 2001). It was found that open communication was positively and strongly correlated with group cohesion (.501) and affective expression (.474), and weakly correlated with resolution (.186) and exploration (.199). Affective expression had a weak positive relationship with direct instruction (.112), as well as a weak correlation with group cohesion (.134) and with exploration (.213). Group cohesion was also found to have a very weak relationship with integration (.089).

Triggering event had a weak correlation with integration (.129) and resolution (.213). Direct instruction had a weak correlation with design and organisation (.273). Exploration had a strong correlation with triggering event (.433), integration (.403) and a weak relationship with direct instruction (.131). Resolution also had a weak correlation with group cohesion (.182) and integration (.154) and a moderate correlation with exploration (.376). Design and organisation had a weak correlation with integration (.195). Facilitation had a strong correlation with design and organisation (.529), direct instruction (.651), resolution (.540), and open communication (.430) and a weak correlation with triggering event (.218) and affective expression (.249).

The two dependent variables, satisfaction and learning, were found to be significantly linked with a strong, positive correlation of .456 which suggests that when students learn they are satisfied with their courses. As previously stated, only some of the dimensions correlated with learning and satisfaction. The dimensions did however, correlate with each other, thereby indirectly impacting learning and satisfaction in the model. While all the dimensions are present to some degree, they are not all correlated with learning and satisfaction. As such, the linkages in the Community of Inquiry model need to be revisited if it is to be applied to UWI STA and perhaps even other Caribbean institutions or similar institutions in

developing nations with similar environments.

Limitations

The ability to generalise the research to a larger population is limited because the data is based on the perceptions of undergraduate students enrolled in the four undergraduate compulsory courses at UWI STA. As such, the findings may not be applicable to other campuses because the e-learning environment may differ. However, whilst the finding might not be easily generalisable, the method and approach may offer some degree of generalisability.

Recommendations

The analysis of this research project suggests students believe that e-learning can be beneficial, but that the teaching staff need to use it more effectively. In particular they felt that many lecturers lacked the basic knowledge and skills needed to operate in a blended learning environment. As a result, it is recommended that the University strengthen training programmes designed to equip teaching staff with the knowledge and skills needed to effectively use the e-learning platform.

It is also recommended that more discussions be introduced into e-learning to facilitate critical thinking, the exchange of ideas and some sense of belonging online. Discussion is an innate part to an inquiry-based learning environment. It is a technique that allows learners to become actively involved and critically informed about a topic. Students can question their own ideas as well as their peers and integrate their peers' knowledge with their own. This contributes to a shared understanding and a worthwhile educational experience. Instructors need to be aware of how students combine teaching, social and cognitive presence in their online participation in order to make meaningful discussions. It is the responsibility of the instructors to implement discussion forums and maintain active and relevant group discussions throughout the semester. It is important to note though that, in any learning environment, the onus is on the student to be active in the learning process and the quality of online interaction that occurs during their group discussions. Nevertheless, it is important that there be some sort of teaching presence, guiding and enabling the discussion.

Future research

This study may be the first in attempting to apply the COI model in the Caribbean. As such, there is opportunity for further research at all tertiary level institutions in the region. Such research should also include the perspective of instructors so as to gain more comprehensive insights into the possibilities and challenges of

e-learning in the Caribbean context.

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