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Effectiveness of Community of Inquiry Model in an Online Class: A Content Analysis

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ABSTRACT

This research was conducted in order to verify empirically the presence and effectiveness of the Community of Inquiry (CoI) model in an online class, EDDE 206 (Research in Distance Education), a course requirement in Master of Distance Education at the University of the Philippines Open University. Results indicated strong interactive relationship among the independent variables (social, cognitive and teacher) following a non- significant difference among the means of the variables based on One Way ANOVA conducted. This result was consistent with the Community of Inquiry (CoI) model of educational experience as a result of the interaction of the three variables (Garisson, Anderson, and Archer, 2000). In establishing the effectiveness of the CoI Model, results indicated positive causal relationship between learning outcome as the dependent variable in the form of coded teacher replies and the three independent variables such that high presence of variables indicated high learning outcome and conversely low presence of variables indicated low learning outcome. The issue on effectiveness of CoI was dealt in the manner that interactive presence of the variables sufficed to say that profound impact occurred based on positive causal relationship.

INTRODUCTION AND PURPOSE OF THE STUDY

Distance education has been around for a long time now and its continued impact on flexible learners who can continue their education without having to attend face-to-face classes and leave work has enriched self-directed learning in many ways. Presently, University of the Philippines Open University (UPOU) is at the forefront of distance education in the country with courses open for both formal and informal learners serving a wide group of flexible learners.

Online learning, due to its highly asynchronous nature, has many considerations to follow to achieve optimal educational experience among students. Because of this asynchronous nature, student-student interaction as well as student-teacher and student-content interaction have to be in place so that learning results are achieved. Various learning tasks such as forum discussions, faculty-marked assignments and some form of synchronous methods including chat, video conferencing are employed to engage participative learning among students. Due to cost considerations, videoconferencing is not among the popular synchronous methods used. In all of these activities done online, the main goal is generally to deliver optimal learning to the main stakeholders – the students.

The Community of Inquiry (CoI) model of Garrison, Anderson and Archer (2000) becomes relevant in an online course, EDDE 206 (Research in Distance Education) because levels of cognitive, social and teacher presence as independent variables used for this quantitative research are theoretically interrelated in achieving educational experience. Using learning outcome in the form of coded teacher replies as dependent variable, this study was conducted to evaluate empirically the effectiveness of the CoI model of online learning in EDDE 206. Likewise, the interrelatedness of the three explanatory variables was quantitatively explored using content analysis to further accentuate the presence of such variables in the class.

RESEARCH QUESTIONS

1. What is the relationship between learning outcome (dependent variable) in the form of teacher replies to student posts to social, cognitive and teacher variables (independent) in EDDE 206?
2. Is there an interaction among the social, cognitive and teacher presence variables of the CoI model in the class?

REVIEW OF RELATED LITERATURE

According to Gozza-Cohen, Jason, Prahalad, Peter, Sedef, Suzanne & Valchova, (2010) complex relationships among cognitive, social and teacher presence revealed implications for higher order thinking skills as seen in the patterns of relationships between such variables in a two semester-length asynchronous college courses. Fisher (2013) employed mixed methodology in a graduate-level educational technology online course which revealed dynamic interaction of the three presence variables with teacher presence posting the highest mean score. Lowest score was evident in students' lack of participation in collaborative activities. The study used CoI instrument survey as originally crafted by Garisson, et. al. (2000) with 34 questions categorized into sub-scales of cognitive, social, and teacher categories. Using descriptive statistics with mean and standard deviation as focus of quantitative solutions, mean of teaching presence at 4.85 (5 being the maximum from the Likert scale) posted the highest followed by the mean of cognitive presence at 4.78 and social presence registered the lowest at 4.43. The study revealed active presence of the three variables which meant the CoI model served as a viable model to achieve educational experience.

CONCEPTUAL FRAMEWORK

Participants in an educational experience include students and the teacher and their interaction is crucial in achieving worthwhile educational experience. The Community of Inquiry (CoI) model assumes that learning occurs within the community through the interaction of three core elements: cognitive presence, social presence and teaching presence (Anderson, Garrison & Archer, 2000). Cognitive presence accentuates student critical thinking process in the search for knowledge; social presence ascertains student participation within the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to the participants as "real people" (Anderson, Garrison & Archer, 2000). In an online learning environment such as the discussion forum in EDDE 206, social presence can be 'felt' through interactive communications between learner as they build social learning. The use of emoticons, for instance, is a way of stating emotional connection to a post. Mentioning the name of a student is another indication of human connection that online learning hopes to build and nurture. In teacher presence, there are functions of an online teacher deemed important for the realization of optimal learning. One is in the design of educational experience as the CoI theory explains. This includes the selection, organization and primary presentation of course elements (Anderson, Garrison & Archer, 2000). Another function attributed to the teacher is facilitation such that student discussions in EDDE 206 are moderated by the teacher. In an online environment, the role of the teacher is transformed into a tutor due to its facilitative responsibility more than a sage on the stage characterizing a classroom teacher. Finally, formative and summative assessment practices are given by the teacher to test learning progress of students. The interaction of these three variables such that teacher presence influences social presence in instructional and facilitative activities, and cognitive presence such that knowledge construction is a pedagogical pursuit of the teacher means that he or she is at the core of achieving educational experience that merits the students.

METHODOLOGY

In conducting this study, the researcher used quantitative coding technique from the data gathered in the forum discussions of EDDE 206. Three presence variables (social, cognitive and teacher) were separately categorized in different rows and by reading the texts in the forum, words and phrases related to any of the presence variable were recorded in respective categories. Student replies constituted the bulk of the coded phrases as the CoI model is an investigation emanating from students. After coding words and phrases in different categories, a number in the form of score was assigned to each word or phrase to indicate presence of such variable. This was the quantitative procedure of the study and from which, descriptive statistics in the form of mean, percentage, one way ANOVA was conducted. To establish causal relationship between the dependent variable and independent variables, coded teacher replies were done from module 1-6 which served as discussion sites in the course portal. Procedure for coding was also done through recording each word or phrase associating learning outcome from teacher replies on various student posts. From the numerical score a statistical mean was also computed for all codes in the modules. To indicate causal relationship of teacher replies and the three presence variables, directions using (+) and (-) signs were used for each module to indicate positive or negative causality among the variables.

STATISTICAL TOOLS

In conducting the quantitative steps, descriptive statistics was mainly used. Average scores for each variable where determined and a one-way ANOVA was conducted to determine any difference among the means of the three independent variables of the study.

DATA ANALYSIS AND INTERPRETATION

Coding

In performing content analysis, quantitative coding procedure was done using the student forum as basis for coding. Words and phrases related to social, cognitive and teacher presence were grouped together. (a complete list of coded text appears at the Appendix page). Coding was specifically performed using student posts minus that of the teacher as the CoI model procedure emphasizes.

From Table 1 below, in Module 1, social presence had the highest score of 28 which meant that student participation was high at this point following Faculty-in-Charge (FIC's) questions on research agenda for each student, building theoretical assumptions among other concerns. This was the setting stage for interactive discussions to transpire as evident in the high number of posts. Likewise, teacher's mode of facilitation was encouraging and explorative. Cognitive presence was found to be the lowest score but could still be considered high relative to the succeeding values in the next modules.

In Module 2, a big drop of score for all variables happened with teacher's presence posting the lowest score at 3. From the original 56% of the total score for teacher's presence valued at 53 for all modules, it dropped to 8% significantly; cognitive presence from 30% to 13%; social presence from 53% to 15%. Module 2 focused on ontological and teleological assumptions. All variables dropped significantly following a drop of student posts in the discussion portal with social presence posting the biggest drop which consequently influenced the other variables.

Table 1: Result of the coding procedure based on teacher and student interactions.

	Social Presence (SP)	Cognitive Presence (CP)	Teacher Presence (TP)
Module 1	28	18	20
Module 2	8	8	3
Module 3	5	10	9
Module 4	6	9	2
Module 5	4	8	1
Module 6	2	7	1
Total Score	53	60	1

Cognitive presence (10) was highest in terms of raw score in Module 3 followed by teacher's presence (9). This module was generally a discussion on quantitative research procedures, validity issues and other pertinent queries of mostly one student as shown in the posts.
Modules 4, 5 and 6 had cognitive presence with the highest value among other variables but a downward trend of presence variables could be noticed.

From the coding procedure, cognitive presence was the strongest value in terms of the raw score with a value of 60. It also registered the highest mean value of 10. In order to explore on the quantitative analysis of this research, one way ANOVA was performed to determine any statistical difference among the means of the three variables which would indicate if the variables interacted effectively such that the mean values would not be widely differentiated.

Quantitative Results

In conducting ONE WAY ANOVA to determine any different of the means of the social, cognitive and teacher elements of COI in the forum discussions, the following procedures were conducted:

1. Null hypothesis (Ho) and Alternative hypothesis (Ao) were set such that:

    H_0: There is no significant difference between the means of cognitive, social and
    teacher's presence.
    A_0: There is at least one difference among the means of the three variables.

2. Degrees of freedom (df) between and within groups were determined as well as the F critical value.

    $df_{between}$ = k-1 where k is the number of groups (3:CP, SP, TP).
    = 3-1= <u>2</u>
    df_{within} = N-k where N is the total number of scores .
    = 18-3=<u>15</u>
    df_{total} = dfbetween + dfwithin
    = 2 + 15
    = <u>17</u>
    -Using the table on degrees of freedom at .05, F = <u>3.68</u>

3. Analysis of the Squares was conducted with the following steps:
    $\underline{X_1}$ = 8.83
    $\underline{X_2}$ = 10
    $\underline{X_3}$ = 6
    Where $\underline{X_1}$, $\underline{X_2}$ and $\underline{X_3}$ stand for the mean for each variable.

Grand Mean = G/N where G is the total score of each sample of the three variables and N is the number of scores for all group variables, thus

Grand Mean = 149/18 = <u>8.278</u>

Sum of Square (SS) Deviation from the Grand Mean:

$SS_{total} = E (X-\underline{X})^2$ where E stands for the sum, X is the score and $\underline{X}$

$= (28-8.278)^2 + (8-8.278)^2 + (5-8278)^2 ……….$

$= \underline{873.622}$

$SS_{within} = E (X_1-\underline{X_1})^2 + (X_2-\underline{X_2})^2 + ……$

$= (28-8.83)^2 + (8-8.83)^2 + (5-8.83)^2 ……$

$= \underline{826.87}$

$SS_{between} = SS_{total} - SS_{within}$

$= 873.622 - 826. 87$

$= \underline{46.752}$

4. Variance between and within groups was calculated: (MS which is the mean squared is the variance)

$MS_{between} = SS_{between}/df_{between}$

$= 46.754/2$

$= \underline{23.38}$

$MS_{within} = SS_{within}/df_{within}$

$= 826.87/15$

$= \underline{55.12}$

5. F-statistic was calculated to determine the region of rejection of the Null (H_0) hypothesis:

$F = MS_{between}/MS_{within}$

$= 23.38/55.12$

$= 0.42$

0.42 is less than 3.68, the $F_{critical}$ value for rejection of H_0.

CONCLUSION: FAILURE TO REJECT THE NULL HYPOTHESIS WHICH STATES THAT THERE IS NO SIGNIFICANT DIFFERENCE AMONG THE MEANS OF THE THREE VARIABLES, SOCIAL, COGNITIVE AND TEACHER'S PRESENCE

Interpretation of Results

The use of One Way ANOVA proved that there was no difference among the means of the three variables of CoI (social, cognitive and teacher) implying that these three variables were interconnected with almost the same effect on overall educational experience. It will be noticed that the lowest mean for teacher's presence (6) against the other two would be indicative of low teacher presence on forum discussions even if direct observation at the student portal suggested high presence with the numerous posts, course preparation and other activities done by the FIC. The significance of the ANOVA result accentuated an indiscriminate impact of the three variables on optimal learning based on the CoI model.

Further analysis on the mean score for each variable exemplified that there was a very high mean value in Module 1 discussions for all three variables and a downward trend from Module 2 to 6. A very critical observation was noticed in that a big drop of score from 28 to 8 in the case of social presence signified a reduction of forum discussions that brought down the values for all variables subsequently so that the score 28 was so far away from the closely linked values of 8, 5, 6, 4 and 2 for social presence which significantly reduced statistical significance of computed mean. This was true for all variables in the study. A separate example suffices the explanation the researcher has presented. If Pres. Aquino receives a mean of 95,000 pesos as monthly income and his cabinet officials with these mean salaries: 20,000, 23,000, 24,000. The computed mean for all salaries including that of the president at 40,500 pesos does not really reflect a true mean as the mean salary of the president is so high compared to the rest of the cabinet members.

An implication of the failure to reject the null hypothesis signifying undifferentiated means among the variables meant that active presence of the three variables was observed in the course, EDDE 206 but there was a question raised whether that presence signified high or low. Looking at the raw scores, it was noticed that the highest scores were obtained in Module1 discussions where questions on Research Agenda dominated student participation and active facilitation from the FIC. If this mode of high interaction proceeded into the next modules, coded scores would have increased which would have significantly increased the mean values. But then again, following the result of the rejection of the null hypothesis with 0.42 less than $F_{critical} = 3.68$, the researcher emphasized the intertwining of the cognitive, social and teacher presence in order to achieve an educational experience consistent with CoI model suggestion.

Causality

To explain the relationship between learning outcome (dependent) in the form of teacher replies which signified performance rating on student posts and the three presence variables (independent) namely cognitive, social and teacher, coding was employed to define such relationship.
Table 2 below indicates plus (+) and minus (-) signs in order to indicate rise and fall of value from its precedent. This method of presentation proved to be effective in determining causality or correlation between dependent and independent variables.

The table has one significant result in that a positive correlation or causality existed between teacher replies and cognitive, social and teacher variables except in Module 3 where teacher presence increased from 3 to 9 indicated by (+) sign while cognitive and social presence on the same module glided down as indicated in the (-) sign and in Module 4 where teacher reply reported (+) as well as social presence except for cognitive and teacher presence where (-) sign was observed. Generally, throughout the table, teacher reply variable falls and rises together with the three variables except in Module 3 and with slight differentiations as explained. What this means is that the three variables interacted positively and moving in the same direction with the learning outcome such that high rating in the dependent variable was a result of high presence variables, and vice versa. For instance, in Module 1, a score of 8 was reported for significant values of social (28), cognitive (18) and teacher (20) which was the highest among all the modules that followed. In Module 6 with the lowest outcome (1) indicated low raw values for all three variables with (-) signs which further strengthened consistency of the result.

Based on the foregoing analytical procedure, the researcher asserts a positive correlation between the learning outcome (dependent variable) and social, cognitive and teacher presence (independent variable).

Modules	Teacher Reply (Learning Outcome)	Social	Cognitive	Teacher
Module 1	8	28	18	20
Module 2	3 (-)	8 (-)	8 (-)	3 (-)
Module 3	2 (-)	5 (-)	10 (+)	9 (+)
Module 4	6 (+)	6 (+)	9 (-)	2 (-)
Module 5	3 (-)	4 (-)	8 (-)	1(-)
Module 6	1 (-)	2 (-)	7 (-)	1
Total	24	53	60	36

Table 2: Result of the coding procedure between dependent and independent variables.

VALIDITY

Based on manipulation of variables through quantitative content analysis using coding technique, internal validity was observed in explaining causality between dependent and independent variables using secondary data from forum discussions at the student portal of EDDE 206 as samples. The independent variables (social, cognitive and teacher) had noticeable impact on the learning outcome (teacher reply) as indicated in the (+) and (-) indications of directional impact. Likewise, the one-way ANOVA result of rejecting the null hypothesis which indicated a non-significant difference between the three variables was indicative of internal validity.

LIMITATION OF THE STUDY

This study was limited to a small sample size of EDDE 206 participants.

FUTURE RESEARCH

Further explorations on the CoI model can be done based on findings of this research. For instance, regression analysis can predict values of learning outcomes based on coefficients of the three variables. A deeper analysis of the variables which incorporate quantitative and qualitative aspects will be another explorative study that can be considered. In the quantitative frontier, multicollinearity or correlation between independent variables without using the dependent variable in the analysis can be an issue to be considered because of the highly correlated nature of the three variables of the CoI model. In the qualitative frontier, a deeper discussion into the nature of relationship between the variables in an online environment can be explored based on interaction between students and the teacher.

CONCLUSION

Using content analysis through quantitative coding procedure, the research found that there was a positive relationship between learning outcome (teacher's reply) as dependent variable and the independent variables (social, cognitive, teacher). This conclusion answered research question no.1: what is the relationship between learning outcome (dependent variable) in the form of teacher replies to student posts to social, cognitive and teacher variables (independent) in EDDE 206?

Next, rejection of the null hypothesis indicated that there was no significant difference among the means of the three dependent variables which implied strong interaction of social, cognitive and teacher presence in EDDE 206. This conclusion answered research question no. 2: Is there an interaction among the social, cognitive and teacher presence variables of the CoI model in the class?

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