

Converged Classroom Approval Based on Student Satisfaction

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Successful decision-making for a classroom modality requires knowledge of how students learn, the use of technology in classrooms, and student perception and satisfaction with various content delivery methods. The problem is that growth and diffusion of technology have outpaced knowledge of the utility of investment in a converged multimedia classroom modality. The purpose of this study was to conduct an empirical analysis of the relationship of student satisfaction with a converged classroom that includes factors: (a) real-time access to an instructor; (b) multimedia format types; and (c) flexible enrollment options for online students, on-campus students, or a combined presence.

INTRODUCTION

The converged classroom is a new learning environment concept combining both blended and online learning environments. A better understanding of student satisfaction and the analysis of contributing factors should make the converged classroom attractive for potential engineering technology students while supporting good administrative decision-making. Will students perceive the converged classroom as an attractively-enhanced environment for learning? The approach toward answering this question led to a quantitative study with the following measurable outcomes; (a) the perceived use of live webcast technology; (b) the perceived use of pre-recorded lecture video technology; (c) the perceived need for student-instructor interaction; (d) the perceived need for student-student interaction; and (e) the perceived use of the flexibility characteristics of the converged classroom. The predictor variable is student learning satisfaction.

The research questions (RQ) and the tested hypotheses were as follows:

- RQ 1: What is the relationship between live webcast media and student satisfaction at a state university? The null hypothesis posited no relationship between live webcast media and student satisfaction.
- RQ2: What is the relationship between pre-recorded lecture video media and student satisfaction at a state university? The null hypothesis posited no relationship between pre-recorded lecture video media and student satisfaction.
- RQ3: What is the relationship between instructor-student interaction and student satisfaction at a state university? The null hypothesis posited no relationship between instructor-student interaction and student satisfaction.

- RQ4: What is the relationship between student-student interaction and student satisfaction at a state university? The null hypothesis posited no relationship between student-student interaction and student satisfaction.
- RQ5: What is the relationship between converged classroom flexibility characteristics and student satisfaction at a state university? The null hypothesis posited no relationship between the converged classroom flexibility characteristics and student satisfaction.

LITERATURE REVIEW

A literature search revealed several theories applicable to this study, including the seminal works of Kolb (1984); Knowles (1980, 1990); Moore (1993); Gagne (1970, 1984); and Mayer (1987, 2001, 2009). Kolb's learning theory for pedagogical learning is a vital concept for general instructional design while complementing Knowles's learning theory of adult learning. The acknowledgment and inclusion of these two theories were necessary to assess the learning needs of traditional and non-traditional engineering students. Moore's transactional-distance theory addressed the psychological and communication concerns of distance learning related to (a) adequate interaction between the learner and instructor, (b) the structure the program, (c) the instructional dialog, and (d) the autonomy of the learner. Gagne's work on the cognitive conditions of learning and instructional theory was instrumental in the skeletal design of the converged classroom. Mayer's work with the use of multimedia in learning applications fits remarkably well in modern times with the ease of downloading multimedia files.

A gap existed in the literature for constructing an exemplary converged-learning environment. Few studies define online learning environments delivered in either asynchronous or synchronous modes or studies providing empirical evidence on factors involving the preference of one environment over the other. For engineering technology students, cognitive processing is (a) centered on problem-solving, (b) intellectual skill, (c) decision-making, and (d) more adaptable as visual learners (Jackson, Gaudet, McDaniel, & Brammer, 2009). Thus, the instructor must understand the students' learning and preference needs in order to make proper course design decisions and a successful learning environment conducive for engineers (Jackson et al., 2009).

METHODOLOGY

The research design consisted of a cross-sectional survey study approach of gathering, analyzing, and presenting data to test factors of the converged-learning modality. The data gathered helped determine (a) students' satisfaction level of multimedia use, (b) the satisfaction of interactive classroom communication, (c) and satisfaction of flexibility factors. This approach addressed the lack of empirical data in this area, and gathered perceptions of the broader population of engineering technology students. The data collection instrument was a one-time online survey students could complete at their convenience. The population of students for this study consisted of 984 engineering technology students at one university with these characteristics: (a) enrolled in an undergraduate program, (b) at least 18 years of age, (c) currently enrolled in school, (d) pursuing an engineering technology degree or certificate, and (e) previous experience with the converged learning environment. The data collection plan via Survey Monkey was a blind and anonymous study. At the end of the survey period, the data was imported into SPSS, mined for completeness and missing values, and determined acceptance of valid cases. A total of 89 useful responses, at an overall 9.0% useful response rate, was received for those respondents who have experienced the converged learning environment. For the reason of understanding predictions and the effect of predictor variables on the outcome variables, correlation and multiple regression techniques were used to analyze the data.

RESEARCH FINDINGS

The participants represented engineering technology students at one university. Some demographics include 60.7% of respondents were between 18 and 25 years of age and 37.1% between 26 and 45 years of age. In addition, the data showed a frequency distribution of 75.3% of the respondents were in the field of industrial engineering technology while the remainder were from other engineering technology fields. Students may have experienced online or hybrid classes separately, but perhaps not the converged class. The study consists of 37.7% of students who selected prior experience with the converged class. The goal of this analysis was to address the research questions.

RQ 1: What is the relationship between *live webcast media* and student satisfaction at a state university? The correlation analysis showed (a) students satisfied with live webcast lectures tend to be satisfied with their learning needs ($r = 0.67$), and (b) students satisfied with live webcast lectures tend to agree with a resemblance to being physically present in class ($r = 0.48$). The results showed $f(2, 86) = 17.449, p = .000, r = 0.537, r^2 = 0.289, \text{Adj. } r^2 = 0.272, \text{Std. Error Est.} = 0.681$. However, only the independent variable Busy Schedule indicated statistical significance with $t = 5.738$ and $p \leq 0.001$ lying outside of the 95% confidence interval of (0.193, 0.397). The Pearson's correlation coefficient, r , was 0.54 indicating approximately 29% (r^2) of the variance of the Live Group in the sample accounted for the linear combination of Busy Schedule and Switch Classes. The regression equation of the prediction line $y = 3.9 + 0.47x$ indicated a positive slope, suggesting students who enroll in online classes due to a busy schedule tend to be satisfied with live webcast multimedia. Based on these results, the researcher rejected the null hypothesis in favor of the alternative hypothesis that there is sufficient evidence to conclude that a significant relationship exists between the use of live webcast media in the classroom and student satisfaction with 95% confidence.

RQ2: What is the relationship between *pre-recorded lecture video media* and student satisfaction at a state university? The correlation analysis showed (a) students satisfied with videos to meet their needs tend to watch pre-recorded lecture videos to help them with complex concepts ($r = 0.64$), (b) students satisfied with videos to meet their needs tend to watch videos to help them learn ($r = 0.61$), (c) students are satisfied with the ability to repeat videos to help with complex concepts ($r = 0.59$), (d) students are satisfied with the ability to repeat videos to meet their needs in general ($r = 0.53$), and (e) students are satisfied with the ability to download videos to help with complex concepts ($r = 0.53$). The results showed $f(2, 86) = 19.596, p = 0.000, r = 0.560, r^2 = 0.313, \text{Adj. } r^2 = 0.297, \text{Std. Error Est.} = 0.699$. However, only the variable Busy Schedule indicated statistical significance with $t = 5.451, p \leq .001$ lying outside of the 95% confidence interval of (0.183, 0.393). The value of $r = 0.56$ indicates that approximately 31% (r^2) of the variance of the Video Group in the sample accounting for the linear combination of Busy Schedule and Switch Classes. The regression equation of the prediction line $y = 3.9 + 0.47x$ indicated a positive slope, suggesting students who enroll in online classes because of a busy schedule tend to be satisfied with video multimedia. Based on these results, the researcher rejected the null hypothesis in favor of the alternative hypothesis that there is sufficient evidence to conclude that a significant relationship exists between the use of pre-recorded lecture video media in the classroom and student satisfaction with 95% confidence.

RQ3: What is the relationship between *instructor-student interaction* and student satisfaction at a state university? Correlation analysis reveals (a) students who interact with other students tend to interact with the instructor during class ($r = 0.63$), (b) students who are satisfied with instructor interaction tend to ask the instructor questions during class ($r = 0.54$), and (c) students perceived a higher satisfaction with instructor-student interaction over student-student interaction ($r = 0.34$). The results showed $f(2, 86) = 16.759, p = 0.000, r = 0.530, r^2 = 0.280, \text{Adj. } r^2 = 0.264, \text{Std. Error Est.} = 0.846$. However, only the variable Busy Schedule indicated statistical significance with $t = 5.576, p \leq 0.001$ lying outside of the 95% confidence interval of (0.229, 0.489). The value of $r = 0.53$ indicates that approximately 28% (r^2) of the variance of the Instructor Group in the sample accounts for the linear combination of Busy Schedule and

Switch Classes. The regression equation of the line $y = 3.52 + 0.52x$ indicated a positive slope, suggesting students who enroll in online classes because of a busy schedule tend to be satisfied with the instructor-student interaction. Based on these results, the researcher rejected the null hypothesis in favor of the alternative hypothesis that there is sufficient evidence to conclude that a significant relationship exists between instructor-student classroom interaction and student satisfaction.

- RQ4: What is the relationship between *student-student interaction* and student satisfaction at a state university? The correlation results suggested a weak, yet mildly significant, relationship among the variables tested (live students interacting with other live students) with the Pearson's coefficient of $r = 0.21$ with $p \leq .008$. Assumption tests for the presence of multicollinearity, normality, and homoscedasticity yielded a failure of the normality test. The researcher lacked confidence in further results, therefore; a regression analysis for student-student classroom interaction was deemed unnecessary. We fail to reject the null hypothesis, meaning there is insufficient evidence to conclude that a significant relationship exists between student-student classroom interaction and student satisfaction.
- RQ5: What is the relationship between converged *classroom flexibility characteristics* and student satisfaction at a state college? From the correlation analysis (a) students who regretted selecting a hybrid class at registration time also regretted selecting an online class ($r = .36$), (b) students who regretted selecting a hybrid class watched archives to stay in school ($r = .30$), and (c) students who watch video archives perceive a greater chance of staying in school ($r = .30$). The results showed $f(2, 86) = 20.927, p = .000, r = .572, r^2 = .327, \text{Adj. } r^2 = .312, \text{Std. Error Est.} = 0.643$. The variable Switch Classes indicated statistical significance with $t = 5.182, p \leq .001$ lying outside of the 95% confidence interval of 0.176 to 0.395. Secondly, the variable Busy Schedule also indicated statistical significance with $t = 2.309$ and $p \leq .05$ lying outside of the 95% confidence interval of 0.016 to 0.209. The value of r was $.57$ indicating approximately 33% (r^2) of the variance of the Flex Group in the sample accounted for the linear combination of Busy Schedule and Switch Classes. The regression equation of the line $y = 3.35 + 0.44x$ indicated a positive correlation suggesting students who enroll in online classes because of a busy schedule tend to be satisfied with the flexibility options. In addition, students who wish to switch classes during a semester tend to be satisfied with the flexibility options. From the analysis, I rejected the null hypothesis stating there is sufficient support for a significant relationship between the converged flexibility characteristics in the classroom and student satisfaction.

CONCLUSIONS

President Clinton signed into law a federal mandate Goals 2000: Educate America Act of 1994 (House Bill 1804, 1994). This mandate included a provision to help adult Americans become literate by obtaining the skills and knowledge to compete effectively in the workplace. This act and the flexibility characteristics of the converged environment coincide with the research topic to promote the enrollment of students who desire to balance work, home, and school responsibilities. Schools with distance-learning programs provide open access for members of the community who have not previously had an opportunity to attend engineering courses due to work, family, and competing responsibilities. The converged-class modality further enhances the opportunity for students to choose to access the instructor synchronously and asynchronously for lectures, demonstrations, and questions, regardless of online or traditional enrollment. The thought of earning technical degrees, such as engineering, can be daunting for some students. This study of student satisfaction involved opportunities to attend instructor's lectures and to participate with other students in a face-to-face class. The converged class is a unique online access to a face-to-face course. The results encourage potential engineers who have feared distance-learning to seek an engineering degree.

The contribution to positive social change includes: (a) students choosing the manner of synchronous access to instructors and multimedia; (b) community members attending engineering courses regardless of work, family, or competing responsibilities; and (c) better preparing the engineering population to help organizations continue to be innovative. This study of an enhanced synchronous distance-learning environment addresses a need for members of the community who lack the opportunity to attend engineering courses due to life responsibilities, to reconsider college enrollment. The converged-class modality provides an opportunity for students to choose to access the instructor regardless of online or traditional enrollment due to a unique technology. Opportunities for students to attend instructor's lectures and to engage with other students in a face-to-face class should encourage potential engineers who have feared distance learning to seek an engineering degree.

The researcher discovered that engineering students tended to be pleased with both live webcasts and pre-recorded lecture video. Students typically enjoyed the synchronous interaction with the instructor and students expressed that live webcast lectures could be the equivalent to a live lecture. In addition, students' generally agreed that flexibility options, such as switching classes and watching archived lectures, help fit into their busy schedules.

REFERENCES

- Gagne, R.M. (1970). *The conditions of learning* (2nd ed.). New York, NY: Holt, Rinehart, and Winston.
- Gagne, R.M. (1984). Learning outcomes and their effects. *American Psychologist*, 39, 377-385. Retrieved from <http://www.apa.org>.
- Jackson, A., Gaudet, L., McDaniel, L., & Brammer, D. (2009). Curriculum integration: The use of technology to support learning. *Journal of College Teaching and Learning*, 6(7), 71-78. Retrieved from <http://journals.cluteonline.com>.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Upper Saddle River, NJ: Prentice Hall.
- Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy* (2nd ed.). New York, NY: Cambridge Books.
- Knowles, M. (1990). *The adult learner: a neglected species* (4th ed.). Houston, TX: Gulf Publishing.
- Mayer, R.E. (1987). *Educational psychology: A cognitive approach*. Boston, MA: Little, Brown.
- Mayer, R.E. (2001). *Multimedia learning*. Cambridge, UK: Cambridge University Press.
- Mayer, R.E. (2009). *Multimedia learning* (2nd ed.). Cambridge, UK: Cambridge University Press.
- Moore, M.G. (1993). Theory of transactional distance. In D. Keegan (Ed.). *Theoretical principles of distance education*. New York, NY: Routledge.