6-2011

# An Exploration of Differences Between Community of Indicators in Low and High Disenrollment Online Courses

Phil Ice
*American Public University System*

Angela M. Gibson
*American Public University System*

Wallace E. Boston
*American Public University System*

Dave Becher
*American Public University System*

# AN EXPLORATION OF DIFFERENCES BETWEEN COMMUNITY OF INQUIRY INDICATORS IN LOW AND HIGH DISENROLLMENT ONLINE COURSES

*Phil Ice*
*Angela M. Gibson*
*Wally Boston*
*Dave Becher*
American Public University System

**ABSTRACT**

Though online enrollments continue to accelerate at a rapid pace, there is significant concern over student retention. With drop rates significantly higher than in face-to-face classes it is imperative that online providers develop an understanding of factors that lead students to disenroll. This study utilizes a data mining approach to examine course-level disenrollment through the lens of student satisfaction with the projection of Teaching, Social and Cognitive Presence. In comparing the highest and lowest disenrollment quartiles of all courses at American Public University the value of effective Instructional Design and Organization, and initiation of the Triggering Event phase of Cognitive Presence were found to be significant predictors of student satisfaction in the lowest disenrollment quartile. For the highest disenrollment quartile, the lack of follow-through vis-à-vis Facilitation of Discourse and Cognitive Integration were found to be negative predictors of student satisfaction.

**KEYWORDS**

Disenrollment, Retention, Online Learning, Community of Inquiry

## I. INTRODUCTION

There has been massive growth in enrollment at both non-profit and for-profit colleges offering distance learning. Trends in online education continue to reflect the surge in growth among the redefined traditional student as both college degrees and internet use are necessities. From 2007 to 2008 there has been a 17% increase in the number of students in postsecondary institutions taking online courses. For academic year 2008-2009 one-fourth of all college students were enrolled in at least one online course resulting in over 4.6 million individuals participating in online classes [1]. Through the capacity of the Web, students aspiring for a higher education now have greater accessibility and choice.

With the increase in distance learning in higher education, especially online learning, there is greater attention to determining what makes online learning successful. Success is often measured through student achievement; course grades and retention rates [2]. With exponential growth in online learning,

retention in online classes, as it is and has been in face to face courses, is an area of concern for administrators, educators, and policy makers alike [3, 2, 4].

## A. Retention Issues

Higher education continues to struggle with retention issues [5, 6]. Student persistence or retention has been a concern of academics for over 100 years [7]. Research and publications on the issue of retention increased in the 1970s and during the 1980s researchers attempted to determine causes of attrition [8, 9, 10, 11, 12]. Research by groups such as the National Survey of Student Engagement (NSSE) and the Community College Survey of Student Engagement (CCSSE) began to focus on effective institutional practices for engagement and persistence [13, 14].

Unfortunately, there has been no singular solution to the daunting and immense issue of student retention in higher education. One in three students leave college after the first year [15, 5], though this astounding percentage of student attrition has been calculated using data from traditional brick and mortar institutions of higher education, not online institutions. From the review of the literature, it is obvious that there are multiple reasons for attrition as well as multiple methodologies for determining and measuring the impact of those items [16, 9, 17, 18, 19, 20, 12, 6]. Students at all institutional types can struggle academically, financially, and socially and the students' ability to adapt, can determine their ability to persist.

## B. At Risk Students

Students are at high-risk for attrition due to multiple factors. The disengagement of students from their class, their peers, the faculty and staff, and the institution as a whole can be but one factor putting a student at-risk for attrition. Such disconnect can be based on social as well as academic factors. Often a gap exists between student expectations and institutional expectations [21]. Lack of academic preparation may be the tipping point in success for a student as they first enter or even return to college [16, 9, 17, 18, 19, 20, 12, 6]. In their quest to examine ways to improve retention, educators continue to search for factors that may impact student academic achievement.

## C. At Risk Populations

Adult learners are students of non-traditional age, 25 and above, and make up the majority of students at both two-year and four-year institutions, yet, this population is proceeding toward completion of their academic career at a slower rate than traditional age students. Non-traditional students in their first year at an on-ground, four-year institution are more likely to enroll part-time than traditional age students. Just under half of adult learners at four-year institutions report working at least 30 hours a week and three-fourths of the same students indicate primary roles in caring for dependents [14].

Another statistic of interest to postsecondary administrators and educational policy makers is the projected rise in enrollment in higher education for students over the age of 25. The National Center for Educational Statistics has projected for traditional age students to increase college enrollment by 10 percent from 2006 to 2017 and for non-traditional age students to increase enrollment by 19 percent during the same time period, a rate of increase almost double that of the younger population. For students age 25 and older, this projection is a 33% increase from the 1995 to 2006 reported numbers [22].

## D. Online Engagement and Retention

A recent study investigated the relationship between end of course Grade Point Average (GPA) and student demographic characteristics at a fully online institution. Using a sample size near 15,000, researchers discovered that student demographic characteristics, a theme so pervasive in the general literature, were not significant in their study [23]. In traditional classrooms, retention and success initiatives may be designed using results from studies on student demographic characteristics.

Engagement, satisfaction, and academic achievement leading to persistence and matriculation haven been linked to certain student demographics, age, gender, and ethnicity in particular, in brick and mortar colleges [8, 21, 18, 24, 19, 25, 10, 12].

A U.S. Department of Education study published in 2009 included evidence that students participating in online learning performed better than students in face-to-face courses [26]. Critical to persistence and eventual matriculation are factors related to student learning. Fostering environments that increase student satisfaction and achievement are critical for colleges as over a million K-12 students in the educational pipeline to postsecondary education have already participated in online learning [4].

How engagement and retention transpire positively in online environments is still uncertain. Necessary for the success of students, online academic programs, and online, as well as blended, institutions, a predictive model to explain retention is critical. Use of the Community of Inquiry Framework (CoI) as a way to explore factors and relationships concerning student attrition is promising. In their 2009 study Boston, Diaz, Gibson, Ice, Richardson, and Swan, [27] utilizing over 28,000 cases of students at a fully-online university, discovered that Social Presence, one of three presences within the CoI, may account for student re-enrollment.

Unfortunately, an extensive gap in the literature remains for information on student engagement and retention at online institutions. To date, research around persistence, in the online environment, has focused almost exclusively on pedagogical practices, with only one published, large-scale, comprehensive study of the relationship between student demographic characteristics and retention, which did not find any correlations between student demographics and retention [28]. Rather, issues related to activity and performance were found to be significant and account for all of the meaningful variance in the study. Notably, this study was conducted at APUS, thus providing a rationale for the use of CoI indicators in this study, as it was hypothesized that they could most directly measure quality and types of activity.

Determination of the factors that positively influence student engagement, retention, and persistence can illuminate effective practices of online institutions of higher education. Further, it should be noted that the preponderance of students in online programs tend to be non-traditional learners, many of whom enter the university through open enrollment policies, thus creating a situation in which an equitable comparison to traditional institutions may not be possible. As such, work on retention and persistence in the online environment needs to be separated from overall trends. This study moves in that direction by examining factors associated with course level withdraw rates.

## E. The Community of Inquiry Framework

Because readers of JALN are familiar with the CoI framework, the following serves as a cursory overview of the model. Emphasis is placed on the survey, which is the instrument utilized in this study.

While researchers have been relatively successful in identifying the properties of successful online education, a more in-depth analysis of the educational and transactional issues requires a

theoretical framework that can provide order and parsimony to the complexities of online learning. One model that has gained a good deal of attention among online educators is the Community of Inquiry (CoI) framework developed by Garrison, Anderson and Archer [29]. The CoI framework is a process model that provides a comprehensive theoretical framework that can inform both research on online learning and the practice of online instruction. It assumes that effective online learning, especially higher order learning, requires the development of community [30, 31, 32], and that such development is not a trivial challenge in the online environment. Thus, the CoI model views the online learning experience as a function of the interaction of three elements: social presence, cognitive presence, and teaching presence (see Figure 1 below). In the sections which follow, each of these three elements are described and research findings concerning them summarized.

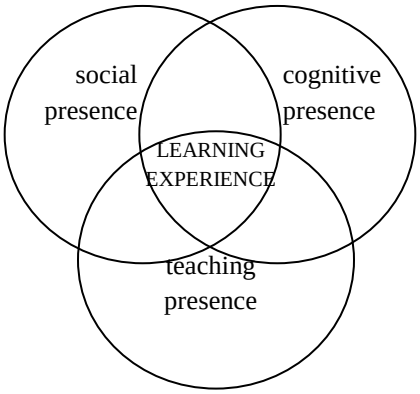


**Figure 1: Community of Inquiry Framework**

In the Community of Inquiry (CoI) framework, *social presence* refers to the ability of learners to project themselves socially and emotionally, "as real people," in an online environment, as well as the degree to which they feel socially and emotionally connected with others in that environment. Although the elements of social presence have been variously defined, in this paper (and in the CoI survey it explores), we identify them as *affective expression*, where learners share personal expressions of emotion, feelings, beliefs, and values; *open communication*, where learners build and sustain a sense of group commitment; and *group cohesion*, where learners interact around common intellectual activities and tasks.

*Cognitive presence* is described as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse [33]. Rooted in Dewey's [34] notion of practical inquiry and the critical thinking it evokes, cognitive presence has long been considered to be a distinguishing characteristic of higher education. The CoI framework maintains that cognitive presence in online learning is developed as the result of a four phase process consisting of: a *triggering event*, where some issue or problem is identified for further inquiry; *exploration*, where students explore the issue both individually and collaboratively through critical reflection and discourse; *integration*, where learners construct meaning from the ideas developed during exploration; and *resolution*, where learners apply the newly gained knowledge to educational contexts or workplace settings Although the model defines four phases in the interests of parsimony, in practice, inquiry does not progress so sequentially or discretely [35].

*Teaching presence* is defined as the design, facilitation, and direction of cognitive and social processes for the realization of personally meaningful and educationally worthwhile learning outcomes [36]. In the CoI model, teaching presence has three elements: *instructional design and organization*, where instructors and/or course designers develop curriculum, activities, assignments and course schedules; *facilitation of discourse*, where instructors set the climate for learning by encouraging and drawing students into online discussion; and *direct instruction*, where instructors present content and focus and direct online discourse. These categories align well with others identified by researchers exploring the roles of instructors in online environments [37, 38].

While the Community of Inquiry (CoI) framework, as a conceptual model, held great promise for bringing order and a theoretical base to research on online learning, there is much work to be done before it can meet that promise. One of the major unifying factors in this line of research was the creation of a common instrument to measure the three presences. Initial research on the CoI concentrated on single components of the CoI model rather than interactions among those components. In addition, much of this isolated research has different measures and often different terminology (especially as regards the elements of social presence).

Understanding that inter-institutional research was needed to both validate the model as a whole and make use of the model in a myriad of studies that could move online learning research significantly forward, a group of CoI researchers, from a variety of institutions and with expertise in the various components of the model, collaborated in the development of a CoI survey instrument. Members of the group submitted potential survey items in their areas of expertise and then the entire group commented and edited the set. Work on the survey took place through document exchange, asynchronous discussion, and phone conferences. In all, the survey went through 13 iterations over a period of six months.

The resulting instrument, the CoI survey (Appendix A), consists of 34 agreed upon and statistically validated items that operationalize the concepts in the CoI model [39]. It includes nine items designed to measure social presence (3 for affective expression, 3 for open communication and 3 for group cohesion), twelve items designed to measure cognitive presence (3 for triggering events, 3 for exploration, 3 for integration, and 3 for resolution) and thirteen items designed to measure teaching presence (4 for design and organization, 6 for facilitation of discourse, and 3 for direct instruction).

The survey can and is being used for continued exploration of concepts in the model and in online learning in general, and can and is sustaining an ongoing research agenda that supports generalizations across institutions and specific studies [27, 40]. The CoI framework and survey can also be used to inform design research on the efficacy of the use of new media and emerging Web 2.0 technologies in online courses [41, 42, 43, 40].

The CoI survey may also be used for practical purposes -- to guide design elements ahead of time, or to evaluate their success in supporting the development of an online community of inquiry, once implemented – in that items in the survey provide insights into the necessary practice-based requirements of each presence [44].

## II. METHOD

This study sought to answer the following research questions:

- RQ 1: Are there conceptual differences in the manifestation of Teaching, Social and Cognitive Presence between high and low disenrollment courses at an online university?

- RQ 2: Are there differences in the factors that account for the variance in students' satisfaction between high and low disenrollment courses?

## A. Instructional Setting

American Military University (AMU), the predecessor of the American Public University System (APUS), accepted its first students in 1993. It originally offered a single Masters program in Military Studies via a modified correspondence format. In January 1996, the institution offered its first bachelor's degree programs and in January 2000, offered its first associates' degree. AMU began converting its curriculum from the correspondence format to online instruction in 1998. By the end of 2000, all of the courses in all degree programs at AMU were online.

In 2002, American Military University changed its accreditation and corporate status to the American Public University System (APUS), encompassing two universities: American Military University and American Public University (APU). In late 2002, APUS applied for accreditation with the Higher Learning Commission of the North Central Association (NCA), with accreditation granted in May 2006.

Following NCA accreditation, APUS grew rapidly, with a 72.1% increase in new students between 2006 and 2007. Because of its open enrollment policy, the lack of physical restrictions limiting enrollment, the increasing popularity of online programs for adult learners, and an adequate supply of qualified instructors, the number of returning undergraduate students was slightly less than the number of new students in contrast to the ratio of new students to returning students at a traditional institution. In other words there were slightly fewer returning students, as a percentage, at APUS as compared to traditional universities. Because of this exceptional growth rate, the administrative and academic leadership expressed concern about the institution's ability to measure the impact of growth on student retention. In 2007, new students dropped out at a rate of 23.8% after taking their second course at APUS. With total enrollments approaching 80,000 in late 2010, the need for developing an understanding of those factors influencing retention patterns was considered imperative.

## B. Design

All courses taught at APUS over a 12 semester period, ending November 30th, 2010, were reviewed for aggregate voluntary withdraw and drop rates. Any course that had under five enrolled students for a semester was excluded from the analysis. Two groups of data were extracted from the overall data set. The top 25% and bottom 25% of all courses, in terms of drop rates, were identified and end of course survey data were obtained from the institution's data warehouse. While a more traditional approach might have been to utilize scores closer to the mean or median for points of comparison, part of the purpose of this study was to provide clarity into differences between the highest and lowest drop rate populations. As such, it was determined that comparison of the two quartiles would be most appropriate as this approach mimics administrative techniques used for high stakes decision making in programmatic review processes.

The CoI survey is administered to students at APUS at the end of every semester as part of a large-scale institutional, continuous quality improvement initiative [45]. In addition to the CoI items, students are also asked, "All things considered, were you satisfied with your studies with us." Data used in this study were collected over a period of 12 semesters. CoI survey scores for the entire population were matched to the two groups (top and bottom 25% in terms of drop rates). Descriptive statistics were used to assess the means and standard deviations for each item. Principal axis factor analysis, with direct oblimin rotation, was used to insure the conceptual integrity of the data by inspection of alignment with the findings of Swan, Richardson, Ice, Garrison, Cleveland-Innes, and Arbaugh [46]. Factor loadings were then

compared for differences in loading strength between the two populations. The purpose of this analysis was to determine if a anomalous loading pattern (e.g a pattern other than the expected three factor solution) emerged that might account for differences in drop rates among the quartiles.

Linear regression was utilized to analyze the relationship between a linear combination of the 34 independent variables (i.e. Likert scale responses to each of the 34 CoI survey items) and the binary dependent variable measuring whether or not a student was satisfied with the course. A binary dependent variable typically demands logistic, as opposed to linear regression. This use of a binary dependent variable with linear regression is supported in the literature even though it compromises the assumption that residuals are normally distributed about the predicted DV scores [47]. The number of subjects included in this study ($n$ = 28,877) ensures adequate statistical power by far exceeding the minimally adequate sample sizes suggested by Green [48]. Multicollinearity is a limitation inherent in this study given the instances of high correlations among the predictor variables.

From a purist standpoint, logistic regression could be considered a more appropriate methodology to use since the dependent variable does not define a continuum of values between zero (i.e. dropped) and 1 (i.e. active). However, linear regression offers the advantage of providing a coefficient of determination that is more definitive. The term *coefficient of determination* refers to a statistic that defines the percentage of variance explained for by the predictor variables. For this reason, the coefficient of determination (expressed as *Adjusted* $R^2$ in regression) helps program directors and administrators decide how heavily to use the results in guiding their decision-making for programmatic improvement. As the goal of this study was to provide both an understanding of relationships and provide actionable intelligence, linear regression was deemed to be the most appropriate methodology. Further, the forward method of entry was used to order predictor variables by their relative statistical significance and variance accounted for in the predictive model.

While utilization of multiple methodologies may be considered counter to traditional multivariate testing techniques, especially those that utilize null hypothesis testing, this study considers this approach to be appropriate in that the purpose is to look for both obvious as well as non-obvious relationships. Through exhaustive data mining and comparing outcomes from multiple tests it is possible to determine if unexpected relationships may exist within data sets that would otherwise not be detected using a single approach to analysis.

## III. RESULTS OF THE STUDY AND DISCUSSION

The total number of courses examined was 1,252 with a total of 64,781 enrollments. The highest disenrollment quartile consisted of 313 courses, with multiple sections caped at a maximum enrollment of 25 students per course, n = 21,218 (response rate = 52.3%), and had a mean drop / withdraw rate of 41.1% (range: 34.7 – 75.0%). The lowest disenrollment quartile consisted of 313 courses, n = 16,732 (response rate = 69.1%), and had a mean drop / withdraw rate of 17% (range: 4.0 – 22.9%).

The mean CoI scores for the groups are presented in the following table:

| | **Highest Drop Quartile Mean Response** | **Highest Drop Quartile Standard Deviation** | **Lowest Drop Quartile Mean Response** | **Lowest Drop Quartile Standard Deviation** |
|---|---|---|---|---|
| 1. The instructor clearly communicated important course topics. | 4.43 | 0.98 | 4.51 | 0.84 |

| | | | | |
|---|---|---|---|---|
| 2. The instructor clearly communicated important course goals. | 4.31 | 1.02 | 4.53 | 0.83 |
| 3. The instructor provided clear instructions on how to participate in course learning activities. | 4.38 | 0.81 | 4.49 | 0.90 |
| 4. The instructor clearly communicated important due dates/time frames for learning activities. | 4.51 | 0.80 | 4.55 | 0.79 |
| 5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn. | 4.18 | 1.01 | 4.35 | 0.99 |
| 6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | 4.01 | 0.83 | 4.37 | 1.03 |
| 7. The instructor helped to keep course participants engaged and participating in productive dialogue. | 4.14 | 0.97 | 4.30 | 1.04 |
| 8. The instructor helped keep the course participants on task in a way that helped me to learn. | 4.16 | 0.73 | 4.33 | 1.02 |
| 9. The instructor encouraged course participants to explore new concepts in this course. | 4.24 | 0.94 | 4.41 | 0.97 |
| 10. Instructor actions reinforced the development of a sense of community among course participants. | 4.10 | 1.12 | 4.29 | 1.07 |
| 11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn. | 4.22 | 0.89 | 4.39 | 1.01 |
| 12. The instructor provided feedback that helped me understand my strengths and weaknesses. | 4.10 | 1.01 | 4.31 | 1.15 |
| 13. The instructor provided feedback in a timely fashion. | 4.16 | 1.08 | 4.30 | 1.16 |
| 14. Getting to know other course participants gave me a sense of belonging in the course. | 3.77 | 0.94 | 4.06 | 1.02 |
| 15. I was able to form distinct impressions of some course participants. | 3.88 | 0.95 | 4.12 | 0.99 |
| 16. Online or web-based communication is an excellent medium for social interaction. | 3.92 | 0.88 | 4.17 | 0.97 |
| 17. I felt comfortable conversing through the online medium. | 4.32 | 0.74 | 4.52 | 0.77 |
| 18. I felt comfortable participating in the course discussions. | 4.33 | 0.71 | 4.51 | 0.80 |
| 19. I felt comfortable interacting with other course participants. | 4.29 | 0.68 | 4.45 | 0.81 |
| 20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. | 4.20 | 0.91 | 4.40 | 0.84 |
| 21. I felt that my point of view was acknowledged by other course participants. | 4.21 | 0.84 | 4.39 | 0.83 |
| 22. Online discussions help me to develop a sense of collaboration. | 4.08 | 0.98 | 4.27 | 0.93 |
| 23. Problems posed increased my interest in course issues. | 4.07 | 1.03 | 4.38 | 0.97 |

| | | | | |
|---|---|---|---|---|
| 24. Course activities piqued my curiosity. | 4.10 | 0.96 | 4.43 | 1.10 |
| 25. I felt motivated to explore content related questions. | 4.22 | 0.93 | 4.39 | 1.05 |
| 26. I utilized a variety of information sources to explore problems posed in this course. | 4.44 | 0.85 | 4.52 | 0.77 |
| 27. Brainstorming and finding relevant information helped me resolve content related questions. | 4.22 | 0.91 | 4.44 | 0.84 |
| 28. Online discussions were valuable in helping me appreciate different perspectives. | 4.11 | 0.99 | 4.23 | 0.93 |
| 29. Combining new information helped me answer questions raised in course activities. | 4.23 | 0.72 | 4.43 | 0.82 |
| 30. Learning activities helped me construct explanations/solutions. | 4.01 | 0.84 | 4.42 | 0.91 |
| 31. Reflection on course content and discussions helped me understand fundamental concepts in this class. | 4.03 | 0.91 | 4.45 | 0.85 |
| 32. I can describe ways to test and apply the knowledge created in this course. | 4.22 | 0.81 | 4.44 | 0.85 |
| 33. I have developed solutions to course problems that can be applied in practice. | 4.20 | 0.77 | 4.41 | 0.87 |
| 34. I can apply the knowledge created in this course to my work or other non-class related activities. | 4.30 | 0.71 | 4.46 | 0.86 |

**Table 1. Mean Community of Inquiry Scores**

The overall Cronbach's Alpha for the highest drop quartile was .931 with respective teaching, social and cognitive presences reliability coefficients of .942, .914 and .946. The overall Cronbach's Alpha for the lowest drop quartile was .949 with respective teaching, social and cognitive presences reliability coefficients of .948, .927 and .955.

Factor analysis for the lowest disenrollment quartile produced an expected three-factor solution. The pattern matrix is presented in the following table:

| | **Factor** | | |
|---|---|---|---|
| | **1** | **2** | **3** |
| The instructor clearly communicated important course topics. | .878 | -.009 | -.008 |
| The instructor clearly communicated important course goals. | .854 | -.001 | -.017 |
| The instructor provided clear instructions on how to participate in course learning activities. | .863 | .002 | .027 |
| The instructor clearly communicated important due dates/time frames for learning activities. | .733 | .036 | -.005 |
| The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn. | .912 | -.001 | -.009 |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | .926 | -.018 | -.023 |
| The instructor helped to keep course participants engaged and | .907 | .043 | .032 |

| | | | |
|---|---|---|---|
| participating in productive dialogue. | | | |
| The instructor helped keep the course participants on task in a way that helped me to learn. | .908 | .015 | -.019 |
| The instructor encouraged course participants to explore new concepts in this course. | .845 | .008 | -.052 |
| Instructor actions reinforced the development of a sense of community among course participants. | .861 | .071 | .001 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to learn. | .852 | -.009 | -.091 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | .866 | -.029 | -.023 |
| The instructor provided feedback in a timely fashion. | .831 | -.012 | .045 |
| Getting to know other course participants gave me a sense of belonging in the course. | .030 | .594 | -.199 |
| I was able to form distinct impressions of some course participants. | .003 | .571 | -.215 |
| Online or web-based communication is an excellent medium for social interaction. | -.022 | .666 | -.098 |
| I felt comfortable conversing through the online medium. | .050 | .875 | .048 |
| I felt comfortable participating in the course discussions. | .074 | .870 | .038 |
| I felt comfortable interacting with other course participants. | .026 | .971 | .102 |
| I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. | .022 | .902 | .064 |
| I felt that my point of view was acknowledged by other course participants. | .024 | .831 | -.028 |
| Online discussions help me to develop a sense of collaboration. | -.012 | .814 | -.077 |
| Problems posed increased my interest in course issues. | .123 | .025 | -.708 |
| Course activities piqued my curiosity. | .139 | -.031 | -.773 |
| I felt motivated to explore content related questions. | .135 | -.042 | -.786 |
| I utilized a variety of information sources to explore problems posed in this course. | -.011 | .114 | -.683 |
| Brainstorming and finding relevant information helped me resolve content related questions. | -.036 | .083 | -.794 |
| Discussing course content with my classmates was valuable in helping me appreciate different perspectives. | -.043 | .411 | -.488 |
| Combining new information helped me answer questions raised in course activities. | -.027 | .109 | -.830 |
| Learning activities helped me construct explanations/solutions. | .079 | .004 | -.833 |
| Reflection on course content and discussions helped me understand fundamental concepts in this class. | .089 | .020 | -.815 |
| I can describe ways to test and apply the knowledge created in this course. | -.006 | -.039 | -.931 |
| I have developed solutions to course problems that can be applied in practice. | -.032 | -.036 | -.951 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | -.018 | -.032 | -.915 |

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 9 iterations.
b. Only cases for which Top 25 = 1 are used in the analysis phase.

**Table 2. Factor Analysis for the Lowest Disenrollment Quartile**

Eigen values for Teaching, Social and Cognitive Presence were 21.237, 6.481, and 1.736 respectively. Variance accounted for by the values were: Teaching Presence = 62.873%, Social Presence = 10.455%, and Cognitive Presence = 5.117%.

Factor analysis for the highest disenrollment quartile produced an expected three-factor solution. The pattern matrix is presented in the following table:

| | Factor | | |
|---|---|---|---|
| | **1** | **2** | **3** |
| The instructor clearly communicated important course topics. | .844 | -.022 | -.060 |
| The instructor clearly communicated important course goals. | .833 | -.016 | -.063 |
| The instructor provided clear instructions on how to participate in course learning activities. | .848 | .015 | .017 |
| The instructor clearly communicated important due dates/time frames for learning activities. | .741 | .060 | .004 |
| The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn. | .890 | -.013 | -.036 |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | .927 | -.031 | -.025 |
| The instructor helped to keep course participants engaged and participating in productive dialogue. | .931 | .046 | .067 |
| The instructor helped keep the course participants on task in a way that helped me to learn. | .919 | .006 | -.008 |
| The instructor encouraged course participants to explore new concepts in this course. | .865 | -.007 | -.047 |
| Instructor actions reinforced the development of a sense of community among course participants. | .861 | .091 | .021 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to learn. | .853 | -.008 | -.076 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | .850 | -.033 | -.038 |
| The instructor provided feedback in a timely fashion. | .846 | -.001 | .072 |
| Getting to know other course participants gave me a sense of belonging in the course. | .031 | .596 | -.197 |
| I was able to form distinct impressions of some course participants. | .035 | .561 | -.181 |
| Online or web-based communication is an excellent medium for social interaction. | -.035 | .647 | -.132 |
| I felt comfortable conversing through the online medium. | .025 | .853 | .013 |

| | | | |
|---|---|---|---|
| I felt comfortable participating in the course discussions. | .085 | .867 | .060 |
| I felt comfortable interacting with other course participants. | .026 | .961 | .099 |
| I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. | .017 | .902 | .073 |
| I felt that my point of view was acknowledged by other course participants. | .022 | .845 | -.008 |
| Online discussions help me to develop a sense of collaboration. | -.014 | .802 | -.079 |
| Problems posed increased my interest in course issues. | .109 | .007 | -.733 |
| Course activities piqued my curiosity. | .116 | -.039 | -.786 |
| I felt motivated to explore content related questions. | .118 | -.045 | -.796 |
| I utilized a variety of information sources to explore problems posed in this course. | .016 | .032 | -.754 |
| Brainstorming and finding relevant information helped me resolve content related questions. | -.035 | .065 | -.790 |
| Discussing course content with my classmates was valuable in helping me appreciate different perspectives. | -.051 | .386 | -.512 |
| Combining new information helped me answer questions raised in course activities. | -.035 | .083 | -.849 |
| Learning activities helped me construct explanations/solutions. | .059 | .031 | -.829 |
| Reflection on course content and discussions helped me understand fundamental concepts in this class. | .057 | .033 | -.832 |
| I can describe ways to test and apply the knowledge created in this course. | .004 | -.017 | -.896 |
| I have developed solutions to course problems that can be applied in practice. | -.032 | -.016 | -.915 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | -.003 | -.029 | -.887 |

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.
a. Rotation converged in 8 iterations.
b. Only cases for which Bottom 25 = 1 are used in the analysis phase.

**Table 3. Factor Analysis for the Highest Disenrollment Quartile**

Eigen values for Teaching, Social and Cognitive Presence were 20.289, 5.983, and 1.538 respectively. Variance accounted for by the values were: Teaching Presence = 60.922%, Social Presence = 9.839%, and Cognitive Presence = 4.726%.

*Forward method* linear regression, illustrated in the following table, resulted in 19 of the 34 CoI items serving as statistically significant predictors of the criterion variable (All things considered, were you satisfied with your studies with us?), for the lowest disenrollment quartile.

| | **Unstandardized** | | **Standardized** | | |
|---|---|---|---|---|---|
| | ***B*** | **Std. Error** | **Beta** | ***t*** | **Sig.** |

| | | | | | |
|---|---|---|---|---|---|
| (Constant) | .555 | .014 | | 39.441 | .000 |
| The instructor clearly communicated important course topics. | .029 | .005 | .126 | 6.139 | .000 |
| I felt motivated to explore content related questions. | .032 | .004 | .147 | 8.819 | .000 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to learn | .020 | .004 | .099 | 4.450 | .000 |
| I felt comfortable conversing through the online medium. | -.019 | .004 | -.074 | -4.812 | .000 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | .019 | .004 | .083 | 4.825 | .000 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | .010 | .003 | .060 | 3.338 | .001 |
| Combining new information helped me answer questions raised in course activities. | -.023 | .005 | -.095 | -4.779 | .000 |
| Learning activities helped me construct explanations/solutions. | .023 | .005 | .101 | 4.660 | .000 |
| I felt that my point of view was acknowledged by other course participants. | -.016 | .004 | -.068 | -4.056 | .000 |
| The instructor provided clear instructions on how to participate in course learning activities. | .014 | .004 | .065 | 3.481 | .001 |
| I utilized a variety of information sources to explore problems posed in this course. | -.010 | .004 | -.039 | -2.411 | .016 |
| Reflection on course content and discussions helped me understand fundamental concepts in this class. | .016 | .005 | .067 | 3.134 | .002 |
| The instructor helped to keep course participants engaged and participating in productive dialogue. | -.011 | .004 | -.059 | -2.504 | .012 |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | .016 | .005 | .083 | 3.490 | .000 |
| Online discussions help me to develop a sense of collaboration. | .010 | .003 | .050 | 3.071 | .002 |

| | | | | | |
|---|---|---|---|---|---|
| Brainstorming and finding relevant information helped me resolve content related questions. | -.008 | .004 | -.036 | -2.166 | .030 |
| Instructor actions reinforced the development of a sense of community among course participants. | -.009 | .004 | -.047 | -2.045 | .041 |

**Table 4. Forward Method Linear Regression for the Lowest Disenrollment Quartile**

The relative contributions of each of the predictor variables to the significant predictive model are listed in the Model Summary below. The *Forward* method in SPSS enters predictor variables one by one in order of decreasing significance. This table, therefore, illustrates the changes in Adjusted R2, for the lowest disenrollment quartile, as each variable is entered:

| **Model Summary** | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change |
| The instructor clearly communicated important course topics. | .397 | .158 | .158 | .150 | .158 |
| I felt motivated to explore content related questions. | .429 | .184 | .184 | .148 | .026 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to learn. | .437 | .191 | .191 | .147 | .007 |
| I felt comfortable conversing through the online medium. | .442 | .196 | .195 | .147 | .005 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | .446 | .199 | .198 | .146 | .003 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | .448 | .201 | .200 | .146 | .002 |
| Combining new information helped me answer questions raised in course activities. | .449 | .202 | .201 | .146 | .001 |
| Learning activities helped me construct explanations/solutions. | .453 | .206 | .205 | .146 | .004 |
| I felt that my point of view was acknowledged by other course participants. | .455 | .207 | .206 | .146 | .001 |
| The instructor provided clear instructions on how to participate in course learning activities. | .456 | .208 | .207 | .146 | .001 |
| I utilized a variety of information sources to explore problems posed in this course. | .457 | .209 | .208 | .145 | .001 |
| Reflection on course content and discussions helped me understand fundamental concepts in this class. | .458 | .210 | .209 | .145 | .001 |
| The instructor helped to keep course participants engaged and participating in | .459 | .210 | .209 | .145 | .001 |

| | | | | | |
|---|---|---|---|---|---|
| productive dialogue. | | | | | |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | .460 | .211 | .210 | .145 | .001 |
| Online discussions help me to develop a sense of collaboration. | .460 | .212 | .211 | .145 | .001 |
| Brainstorming and finding relevant information helped me resolve content related questions. | .461 | .213 | .211 | .145 | .000 |
| Instructor actions reinforced the development of a sense of community among course participants. | .461 | .213 | .211 | .145 | .000 |

**Table 5. Relative Contributions of Predictor Variables for the Lowest Disenrollment Quartile**

*Forward method* linear regression, illustrated in the following table, resulted in 15 of the 34 CoI items serving as statistically significant predictors of the criterion variable (All things considered, were you satisfied with your studies with us?), for the highest disenrollment quartile.

| | **Unstandardized Coefficients** | | **Standardized Coefficients** | ***t*** | **Sig.** |
|---|---|---|---|---|---|
| | ***B*** | **Std. Error** | **Beta** | | |
| (Constant) | .662 | .012 | | 55.561 | .000 |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | -.023 | .004 | -.096 | -5.575 | .000 |
| Reflection on course content and discussions helped me understand fundamental concepts | -.034 | .004 | -.118 | -8.024 | .000 |
| The instructor clearly communicated important course topics. | -.029 | .004 | -.102 | -7.179 | .000 |
| I felt motivated to explore content related questions | -.017 | .004 | -.065 | -4.246 | .000 |
| I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. | .020 | .003 | .065 | 7.308 | .000 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to | -.017 | .004 | -.069 | -4.283 | .000 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | -.027 | .003 | -.095 | -7.866 | .000 |
| I utilized a variety of information sources to explore problems posed in this course. | .019 | .003 | .059 | 5.816 | .000 |

| | | | | | |
|---|---|---|---|---|---|
| I was able to form distinct impressions of some course participants. | .013 | .002 | .051 | 5.805 | .000 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | -.012 | .003 | -.056 | -4.399 | .000 |
| The instructor provided clear instructions on how to participate in course learning activities. | -.018 | .004 | -.068 | -5.070 | .000 |
| Combining new information helped me answer questions raised in course activities. | .025 | .004 | .081 | 5.838 | .000 |
| Learning activities helped me construct explanations/solutions. | -.021 | .004 | -.074 | -4.921 | .000 |
| The instructor helped keep the course participants on task in a way that helped me | -.016 | .004 | -.064 | -3.874 | .000 |
| Course activities piqued my curiosity. | -.013 | .004 | -.049 | -3.230 | .001 |

**Table 6. Forward Method Linear Regression for the Highest Disenrollment Quartile**

The relative contributions of each of the predictor variables to the significant predictive model. The *Forward* method in SPSS enters predictor variables one by one in order of decreasing significance. This table, therefore, illustrates the changes in Adjusted R2, for the highest disenrollment quartile, as each variable is entered:

| Model Summary | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change |
| The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking. | .503a | 0.253 | 0.253 | 0.206 | 0.253 |
| Reflection on course content and discussions helped me understand fundamental concepts in this class. | .526b | 0.277 | 0.277 | 0.203 | 0.023 |
| The instructor clearly communicated important course topics. | .535c | 0.286 | 0.286 | 0.202 | 0.01 |
| I felt motivated to explore content related questions. | .539d | 0.29 | 0.29 | 0.201 | 0.004 |
| I felt comfortable disagreeing with other course participants while still maintaining a sense of trust. | .543e | 0.295 | 0.295 | 0.2 | 0.005 |
| The instructor helped to focus discussion on relevant issues in a way that helped me to learn. | .546f | 0.298 | 0.298 | 0.2 | 0.003 |
| I can apply the knowledge created in this course to my work or other non-class related activities. | .548g | 0.3 | 0.3 | 0.2 | 0.002 |

| | | | | | |
|---|---|---|---|---|---|
| I utilized a variety of information sources to explore problems posed in this course. | .550h | 0.302 | 0.302 | 0.199 | 0.002 |
| I was able to form distinct impressions of some course participants. | .551i | 0.304 | 0.304 | 0.199 | 0.002 |
| The instructor provided feedback that helped me understand my strengths and weaknesses. | .553j | 0.305 | 0.305 | 0.199 | 0.001 |
| The instructor provided clear instructions on how to participate in course learning activities. | .553k | 0.306 | 0.306 | 0.199 | 0.001 |
| Combining new information helped me answer questions raised in course activities. | .554l | 0.307 | 0.307 | 0.199 | 0.001 |
| Learning activities helped me construct explanations/solutions. | .555m | 0.308 | 0.308 | 0.199 | 0.001 |
| The instructor helped keep the course participants on task in a way that helped me to learn. | .556n | 0.309 | 0.308 | 0.198 | 0.001 |
| Course activities piqued my curiosity. | .556o | 0.309 | 0.309 | 0.198 | 0 |
| The instructor clearly communicated important due dates/time frames for learning activities. | .556p | 0.31 | 0.309 | 0.198 | 0 |

**Table 5. Relative Contributions of Predictor Variables for the Highest Disenrollment Quartile**

# IV. CONCLUSIONS

Comparison of descriptive statistics revealed relatively similar means and standard deviations for all 34 items, in both the high and low disenrollment quartiles. Overall, the average mean of all items in the high disenrollment quartile was 4.18 (sd = .890) and was 4.38 (sd = .929) for the low disenrollment quartile. It should be noted that no item in the high disenrollment quartile had a higher mean than the corresponding item in the low disenrollment quartile, with a range between quartile differences of .04 to .42. However, it should be noted with the exception of three items in the high disenrollment group, all responses were in the low to mid agreement range (4.0 – 4.5), indicating generalized satisfaction among student in both groups.

Factor analysis produced the expected three-factor solution for both the high and low disenrollment quartiles, with only very minor differences in loadings. Likewise, Eigen values and variance accounted for in the two models were only slightly different. From a structural perspective this is of significance in that it indicates that, overall, courses in both the high and low disenrollment quartiles were conceptually grounded in a constructivist, collaborative school of thought and in alignment with the philosophical underpinnings of the CoI. As such, the possibility of high disenrollment as a function of structural deficiencies, at the macro level can be largely discounted.

The most significant findings revealed in the study were found in the regression analysis. For the low disenrollment quartile, a total of 21.1% of the variance in overall satisfaction was accounted for by 19 of

the CoI indicators. However, all but 2.7% of that variance was accounted for by two indicators:

1. The instructor clearly communicated important course topics;

2. I felt motivated to explore content related questions.

The first indicator accounts for 15.8% (i.e. almost all) of the total variance and the latter accounts for 2.6%. This suggests that adequate manifestation of instructional design and organization elements are key to satisfaction with achievement in the course. While surprising that so much of the variance in satisfaction with a course of study is captured by one item, it is not inconsistent with findings by [49] and the body of literature reviewed by Akyol, Arbaugh, Cleveland-Innes, Garrison, Ice, Richardson, and Swan [50] and Richardson, Arbaugh, Cleveland-Innes, Ice, Swan, and Garrison [51]. Likewise, the fact that the latter item, which is an indicator of cognitive presence, accounts for the remaining meaningful variance is consistent with work by Dziuban and colleagues [52] in which engagement and motivation were found to be key to student satisfaction in online learning. Of the remaining significant predictors, none accounted for over 1% of variance. As such, even though statistically significant, these predictors are not considered meaningful in any practical context.

For the high disenrollment quartile, a total of 30.9% of the variance in student re-enrollment was accounted for by 15 of the CoI indicators. However, all but 3.3% of that variance was accounted for by two indicators:

1. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking;

2. Reflection on course content and discussions helped me understand fundamental concepts in this class.

The first indicator accounts for 25.3% (i.e. almost all) of the total variance and the latter accounts for 2.3%. Notably, both of these are negative predictors. Of the remaining significant predictors, none accounted for over 1% of variance. As such, even though statistically significant, these predictors are not considered meaningful in any practical context. To understand why these first two items may have had such a significant influence on lack of satisfaction, it is informative to examine the related descriptive statistics.

For the first item, the low disenrollment quartile had a mean reply of 4.37. In contrast, the high disenrollment quartile had a mean reply of 4.01. For the latter item, the low disenrollment quartile had a mean reply of 4.45. In contrast, the high disenrollment quartile had a mean reply of 4.03. With between quartile differences of .36 and .42, respectively, the differences between these predictors were at the high end of the range (.04 - .42).

As previously noted, the difference in means between the low and high disenrollment quartiles was small, with all indicating a moderate to high level of student satisfaction. However, given the large amount of variance in overall satisfaction accounted for by two items representative of the far end of the range, it may be reasonable to assume that even small differences between courses can impact overall satisfaction.

Despite having very high return rates (52.3% for the highest disenrollment quartile), it is important to note that responses were only collected from students who completed the course. As such, it is likely that satisfaction levels may have been significantly lower for those who dropped out of the classes before completing a survey.

To understand potential causality, it is important to view the relationship between the items that were found to account for the greatest degree of variance in the two quartiles. In the low disenrollment quartile, we see clear goal setting and motivation to engage in discovery to be the most important factors. As previously noted the importance of this transition from teaching presence to cognitive presence was first noted by Akyol and Garrison [49] and found to be a generalizable sequence that accounts for satisfaction and the attainment of meaningful learning outcomes. In other words, clear and robust actions on the part of instructors can catalyze the triggering event phase of cognitive presence. From this juncture, learners engage in the exploration, integration and evaluation phases of knowledge attainment.

Interestingly, the items that were negative predictors, and accounted for all of the meaningful variance in overall satisfaction, for the highest disenrollment quartile were also teaching and cognitive presence items. However, both were items that follow their counterpart predictors in the low disenrollment quartile; guiding the class towards understanding course topics (a facilitation of discourse indicator) follows communication of topics and reflection on course content (a instructional design and organization indicator) and discussion (an indicator of integration) follows attainment of motivation to explore content (a triggering event indicator).

While it is part of any institutions mission to help students be successful, one of the potential implications of this study is that course drop out, and retention in general, may, to some extent, be a student specific problem that is beyond the scope of the university to address. If so, then self efficacy may play a large role in students ability to effectively engage in learning communities [53]. From an institutional perspective this may indicate a need for early targeting of learners who are at most at risk and developing programs to help enhance self efficacy and initiatives to catalyze engagement.

# V. LIMITATIONS AND DIRECTION FOR FUTURE RESEARCH

While "stage setting" strategies appear to be significant predictors of overall satisfaction in courses with low disenrollment, dissatisfaction with subsequent engagement may have an equal, if not larger, influence on satisfaction with courses that have high disenrollment. For practitioners this means insuring that learner satisfaction and perceived learning effectiveness, two of Sloan-C's Pillars of Effectiveness [54], are maintained throughout a course. Using the CoI as a guiding paradigm, this approach translates into effective follow-up on instructional design and organization with consistent and meaningful facilitation of discourse and direct instruction. Similarly, designing triggering events that stimulate intellectual curiosity is not sufficient without effectively guiding students through exploration, integration and evaluation.

In the discussion section, it was noted that it appears that even small differences in student satisfaction, particularly with elements of Teaching Presence, may impact the likelihood that a student will disenroll. While a great deal of work has been done in the area of the CoI's Teaching Presence construct and Sloan-C's Learning Effectiveness Pillar, it is suggested that more granular work needs to be done to tease out discrete differences and their impact on student satisfaction.

From a methodological perspective, the criterion variable used in the regression analysis (All things considered, were you satisfied with your studies with us) is problematic in that the word studies might be applied to studies beyond the course for which the survey is administered. However, this is a question that is required for federal reporting that APUS is required to participate in. As such, this is a limitation that would likely be present at a number of other online institutions. Though it should be noted that the term studies is used to refer to course level objectives through varies institutional communications with students and is fairly well embedded within the university culture.

Despite the large amount of data reviewed in this study, the conclusions reached should not be considered conclusive as there are several limitations. First, assessment of factors related to disenrollment were based on measurement of satisfaction from only those students who remained enrolled in the course. Ideally, this would include administration of the CoI survey to students who dropped or disenrolled from a course, as well as qualitative questions or interviews to confirm inferences from quantitative data. However, return rates from students who drop out of courses (or programs) are generally exceedingly low. As an alternative, collection of granular transactions from learning management systems (LMS) and data from student information systems (SIS) may prove effective if reduced to variables that can be used in quantitative analysis. In the traditional face-to-face environment, Tinto [12] found that student background characteristics are a significant predictor of disenrollment. While qualitative and quantitative work would need to be conducted to tease out differences in how background characteristics impact student interactions in the online environment, the inclusion of quantified SIS data would be a suggested next step.

Whether on a stand-alone basis or in conjunction with transactional LMS and SIS data, a follow-up to this study should utilize decision tree analysis to determine if the relationships between predictor variables, posited here, do indeed exist. By utilizing $\chi^2$ significance levels to determine which predictor variable explains the most variance in the dependent variable and then repeating the process for all significant predictor variables until significant $\chi^2$ values are no longer obtained, decision trees provide a visual depiction of criterion and predictor variable interactions that may not be otherwise observable or detected in traditional analytic procedures.

However, research should not be contained by those factors that appear to be logically connected. Rather, it is suggested that the CoI survey data, LMS and SIS data be used as nodes in neural network analysis against satisfaction and retention data to explore non-obvious relationships. Given emerging technological advancements in data federation and computing power, the ability increases for researchers to engage in mining of extremely large data sets with no assumptions about what variables may or may not be relevant. While on the surface this approach may appear to be out alignment with traditional academic practices, it is predicated on the same powerful analytical techniques that credit card companies use to detect fraud and Amazon uses to suggest books a reader might like. With the rapid expansion of online learning, these types of techniques must be leveraged to provide continuous programmatic improvement and rapidly enhance the quality of learning

# VI. ABOUT THE AUTHORS

**Phil Ice, Ed.D.** is VP of Research and Development at American Public University System. His research is focused on the impact of new and emerging technologies on cognition in online learning environments. Work in this area has brought Phil international recognition in the form of three Sloan-C Effective Practice of the Year Award's (2007, 2009 and 2010), application of his work at over 50 institutions of higher education in 5 countries, membership in Adobe's Higher Education Leader's Advisory Committee, receipt of the Adobe Education Leader's Impact Award, multiple invited presentations, workshops and book chapters related to the integration of emerging technologies in online courses and the impact on teaching, social and cognitive presence. Examples of his research include the use of embedded asynchronous audio feedback mechanisms, using web 2.0 tools for collaborative construction of knowledge through integration of RIAs and remote observation of student teaching experiences using asynchronous, flash- based environments.

**Angela M. Gibson, Ed.D.** is the Instructional Design Project Leader at American Public University System. Her research interests focus on student engagement and retention, the role of technology in course design and instruction, online learning environments, and adult education. Specific areas of

research include instructional and collaborative methods to enhance online transparency and learning, effective characteristics of K-12 teachers, Hispanic student performance on Advanced Placement tests, engagement of first-year and at-risk populations at community colleges and universities, and student success at online institutions.

**Wallace Boston, Jr., Ed.D.** was appointed as President and Chief Executive Officer of American Public University System (APUS) and its parent company, American Public Education, Inc. (APEI) in July 2004. He joined APUS in 2002 as its Executive Vice President and Chief Financial Officer. Dr. Boston guided APUS through its successful accreditation with the Higher Learning Commission of the North Central Association in 2006. In 2006, he initiated the application to be the first totally distance learning university to receive Federal Student Aid after the repeal of the 50/50 rule. In November 2007, Dr. Boston led APEI to an initial public offering on the NASDAQ Exchange and led successful secondary offerings in February and December of 2008. In 2008, the Board of Trustees of APUS awarded him a Doctorate in Business Administration, *honoris causa*. Under Wallace's guidance, APUS was recognized by Sloan-C for Excellence in Data Driven Decision Making with the Ralph C. Gomory Award.

**David Becher** is the Director of Academic Information Analysis at American Public University System. He joined APUS in 2006 as the Decision Support Team Leader. His research interests focus on data driven decision making using statistical, predictive, and text analytics. Specific areas of research include student retention and engagement. He was part of the team that was recognized by Sloan-C with the Ralph C. Gomory Award for Excellence in Data Driven Decision Making. Dave has also been very active with IBM / SPSS in working with beta level software and exploratory methodologies related to retention and learning effectiveness.

## VII. REFERENCES

1. **Greer, J.** Study: Online education continues its meteoric growth, *U.S. News and World Report*, 2010. http://www.usnews.com/education/online-education/articles/2010/01/26/study-online-education-continues-its-meteoric-growth?s_cid=related-links:TOP
2. **Deka, T. S. and P. McMurry.** Student success in face-to-face and distance teleclass environments: A matter of contact? *The International Review of Research in Open and Distance Learning*, 7(1), 2006.
3. **Carr, S.** As distance education comes of age, the challenge is keeping the students. *The Chronicle of Higher Education* 46(23): A39-A41, 2000.
4. **Picciano, A. G. and J. Seaman.** *K–12 online learning: A survey of U.S. school district administrators*. Boston: Sloan Consortium, 2007. http://sloanconsortium.org/sites/default/files/K-12_Online_Learning_1.pdf
5. **Kinzie, J.** Using NSSE results to foster collaboration on assessment and retention. Presented at the meeting of the NASPA IARC, June 10-13, in New Orleans, LA, 2009. http://archive.naspa.org/prodev/cfp/coord/upload/Kinzie%20NASPA%20IARC%202009%20Using%20NSSE%20Collaborative%20Partnerships.pdf
6. **Tinto, V.** Student retention and graduation: Facing the truth, living with the consequences. *The Pell Institute,* 2004. http://www.pellinstitute.org/tinto/TintoOccaisonalPaperRetention.pdf
7. **Theilin, J. R.** *A history of American higher education.* Baltimore: The Johns Hopkins University Press, 2004.
8. **Astin, A. W.** *What matters in college: Four critical years revisited.* San Francisco: Jossey-Bass, 1993.

9. **Chickering, A. W. and Z. F. Gamson.** Seven principles for good practice in undergraduate education. *American Association Higher Education Bulletin* 39(7): 3–7, 1987.
10. **Pascarella, E. T. and P. T. Terenzini.** *How college affects students: A third decade of research.* San Francisco: Jossey-Bass, 2005.
11. **Tinto, V.** Dropout from higher education: A theoretical synthesis of recent research. *Review of Education Research* 45(1): 89-125, 1975.
12. **Tinto, V.** *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: The University of Chicago Press, 1993.
13. **Community College Survey of Student Engagement.** *Committing to student engagement: Reflections on CCSSE's first five years: 2007 findings,* 2007. http://www.ccsse.org/publications/2007NatlRpt-final.pdf
14. **National Survey of Student Engagement.** *National survey of student engagement annual report 2006: Engaged learning: Fostering success for all students,* 2006. http://nsse.iub.edu/NSSE_2006_Annual_Report/docs/NSSE_2006_Annual_Report.pdf
15. **Barefoot, B. O.** The first-year experience. *About Campus* 4(6): 12–18, 2000.
16. **Braxton, J. M.** The first-year experience. *About Campus* 4(6): 12-18, 2000.
17. **Chickering, A. W. and Z. F. Gamson.** Applying the seven principles for good practice in undergraduate education. *New directions for teaching and learning* (Vol. 47). San Francisco: Jossey-Bass, 1991.
18. **Kuh, G. D.** What student engagement data tell us about college readiness. **Peer Review** 9(1): 4–8, 2007.
19. **McCabe, R.** Under prepared students. Measuring up 2000: The state by state report card for higher education. *The National Center for Public Policy and Higher Education,* 2000. http://measuringup.highereducation.org/2000/articles/UnderpreparedStudents.cf
20. **Marklein, M. B.** College ''swirling'' muddies quality. *USA Today* Life, 6D, 2005.
21. **Gonyea, R. M., Kuh, G. D., Kinzie, J., Cruce, T. and T. Nelson Laird.** The influence of high school engagement and pre-college expectations on first-year student engagement and self-reporting learning outcomes at liberal arts institutions. Paper presented at the Annual Meeting of the Association for the Study of Higher Education, November 2-4, in Anaheim, California, 2006. http://nsse.iub.edu/pdf/conference_presentations/2006/Expectations%20and%20Engagement%20ASHE%202006%20Gonyea%20Kuh%20Kinzie.pdf
22. **National Center for Education Statistics.** *Digest of Education Statistics, 2008,Chapter 3*.U.S. Department of Education, 2009. http://nces.ed.gov/pubs2009/2009020_3a.pdf
23. **Gibson, A. M., Kupczynski, L. and P. Ice.** Student success in top 20 courses of an online institution: Demographic differences in a multi-semester cross-curricular study. *i-manager's Journal of Educational Technology* 7(2), 2010.
24. **Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J. and R. M. Gonyea.** Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education* 79(5): 540-563, 2008.
25. **Pascarella, E. T. and P. T. Terenzini.** *How college affects students: Findings and insights from twenty years of research.* San Francisco: Jossey-Bass, 1991.
26. **U.S. Department of Education.** *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies*. Washington, D.C., 2009. http://www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf
27. **Boston, W., Diaz, S., Gibson, A., Ice, P., Richardson, J. and K. Swan.** An exploration of the relationship between indicators of the Community of Inquiry Framework and retention in online programs. *Journal of Asynchronous Learning Networks* 13(3): 2009.
28. **Boston, W. and P. Ice.** Measuring student retention in online courses. Paper presented at the 16th annual Sloan-C International Conference on Online Learning, November 3-5, in Orlando, Florida. 2010.

29. **Garrison, D. R., Anderson, T. and W. Archer.** Critical inquiry in a text-based environment: Computer conference in higher education. *The Internet and Higher Education* 2: 87-105, 2000.
30. **Rovai, A. P.** Sense of community, perceived cognitive learning, and persistence in asynchronous learning networks. *The Internet and Higher Education* 5(4): 319-332, 2002.
31. **Thomas, T. L. and C. J. MacDonald**. Community building, emergent design and expecting the unexpected: Creating a quality eLearning experience. *The Internet and Higher Education* 8(3): 233-249, 2005.
32. **Shea, P.** A study of students' sense of learning community in online environments. *Journal of Asynchronous Learning Networks* 10(1): 35-44, 2006.
33. **Garrison, D. R., Anderson, T. and W. Archer.** Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education* 15(1): 7–23, 2001.
34. **Dewey, J.** *How we think* (revisited ed.). Boston: D.C. Health, 1933.
35. **Garrison, D. R. and T. Anderson.** E-*Learning in the 21st century: A framework for research and practice.* London: Routledge/Falmer, 2003.
36. **Anderson, T., Rourke, L., Garrison, D. R. and W. Archer.** Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks* 5(2): 1-17, 2001.
37. **Berge, S. L.** Facilitating computer conference: Recommendations for the field. *Educational Technology* 15(1): 22-30, 1995.
38. **Coppola, N. W., Hiltz, S. R. and N. Rotter.** Becoming a virtual professor: Pedagogical roles and ALN. HICSS 2001 Proceedings. IEEE Press, 2001.
39. **Arbaugh, J. B., M. Cleveland-Innes, S. R. Diaz, D. R. Garrison, P. Ice, J. C. Richardson and K. P. Swan.** Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *Internet and Higher Education* 11(3–4): 133–136, 2008.
40. **Shea, P. and T. Bidjerano.** Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. *Computers and Education* 52(3): 543–553, 2009.
41. **Garrison, R. and Z. Akyol.** Role of instructional technology in the transformation of higher education. *Journal of Computing in Higher Education* 21: 19–30, 2009.
42. **Ice., P., Curtis, R., Phillips, P. and J. Wells.** Using asynchronous audio feedback to enhance teaching presence and student sense of community. *Journal of Asynchronous Learning Networks* 11(2): 3–25, 2007.
43. **Ice, P., Swan, K., Diaz, S., Kupczynski, L. and A. Swan-Dagen.** An analysis of students' perceptions of the value and efficacy of instructors' auditory and text-based feedback modalities across multiple conceptual levels. *Journal of Educational Computing Research* 43(1): 113-134, 2010.
44. **Ice, P.** Using the Community of Inquiry Framework survey for multi-level institutional evaluation. Paper presented at the 26th Annual conference on Distance Teaching and Learning, August 4-6, in Madison, Wisconsin, 2010.
45. **Ice, P. and J. Richardson.** Using the Community of Inquiry Framework survey for multi-level institutional evaluation and continuous quality improvement. http://www.sloan-c.org/node/1931
46. **Swan, K., J. C. Richardson, P. Ice, D. R. Garrison, M. Cleveland-Innes and J. B. Arbaugh.** Validating a measurement tool of presence in online communities of inquiry. *eMentor* 24I (2): 2008. http://www.e-mentor.edu.pl/artykul_v2.php?numer=24&id=543.
47. **Cohen, J., P. Cohen, S. West and L. Aiken.** *Applied multiple regression/correlation analysis for the behavioral sciences* 3rd ed. Mahwah, NJ: Lawrence Erlbaum, 2002.
48. **Green, S. B.** How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research* 26: 499-510, 1991.

49. **Akyol, Z. and D. R. Garrison.** The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks* 12(3): 3-22, 2008.
50. **Akyol, Z., Arbaugh, B., Cleveland-Innes, M., Garrison, R., Ice, P., Richardson, J. and K. Swan.** A response to the review of the Community of Inquiry Framework. *Journal of Distance Education* 23(2): 123-136, 2009.
51. **Richardson, J. C., Arbaugh, J. C. Cleveland-Innes, M., Ice, P., Swan, K. and D. R. Garrison.** Using the community of inquiry framework to inform effective instructional design. *In L. Moller & J. Huett (Eds.). The Next Generation of Education.* New York: Springer Publishing, In Press.
52. **Dziuban, C., Moskal, P., Brophy, J. and P. Shea.** Student satisfaction with asynchronous learning. Journal of Asynchronous Learning Networks *11*(1): 2007. http://www.sloan-c.org/publications/jaln/v11n1/pdf/v11n1_10dziuban.pdf.
53. **Shea, P. and T. Bidjerano.** Learning presence: Towards a theory of self-efficacy, self-regulation and the development of communities of inquiry in online and blended learning environments. Computers & Education, 55: 1721-1731, 2010.
54. **Moore, J.** C. *Elements of quality: The Sloan-C framework*. Needham, MA: SCOLE (Sloan Center for Online Education), 2002.

# VIII. APPENDIX A

***Community of Inquiry Survey Instrument (draft v15)***

***Developed by Ben Arbaugh, Marti Cleveland-Innes, Sebastian Diaz, Randy Garrison, Phil Ice, Jennifer Richardson, Peter Shea & Karen Swan***

***Teaching Presence***

*Design & Organization*

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.

*Facilitation*

5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.

*Direct Instruction*

11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses.
13. The instructor provided feedback in a timely fashion.

### *Social Presence*

*Affective expression*

14. Getting to know other course participants gave me a sense of belonging in the course.
15. I was able to form distinct impressions of some course participants.
16. Online or web-based communication is an excellent medium for social interaction.

*Open communication*

17. I felt comfortable conversing through the online medium.
18. I felt comfortable participating in the course discussions.
19. I felt comfortable interacting with other course participants.

*Group cohesion*

20. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
21. I felt that my point of view was acknowledged by other course participants.
22. Online discussions help me to develop a sense of collaboration.

### *Cognitive Presence*

*Triggering event*

23. Problems posed increased my interest in course issues.
24. Course activities piqued my curiosity.
25. I felt motivated to explore content related questions.

*Exploration*

26. I utilized a variety of information sources to explore problems posed in this course.
27. Brainstorming and finding relevant information helped me resolve content related questions.
28. Discussing course content with my classmates was valuable in helping me appreciate different perspectives.

*Integration*

29. Combining new information helped me answer questions raised in course activities.
30. Learning activities helped me construct explanations/solutions.
31. Reflection on course content and discussions helped me understand fundamental concepts in this class.

*Resolution*

32. I can describe ways to test and apply the knowledge created in this course.
33. I have developed solutions to course problems that can be applied in practice.

34. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree