Scholarship of Teaching and Learning Grant Proposal

Examining the Impact of Case-Based Discussions on Student's Cognitive Presence and

Learning Outcomes in Online Courses

Instructional Systems Technology

Dr. Ayesha Sadaf (PI)

Assistant Professor, Department of Educational Leadership, College of Education

Educational Researcher

Dr. Stella Kim (Co-PI)

Assistant Professor, Department of Educational Leadership, College of Education

October 31, 2018

I.   Abstract

Case studies hold great potential for engaging students in disciplinary content and facilitating deep and meaningful approaches to learning. It is one of the promising approaches used to facilitate high-level learning in online courses. The importance of cognitive presence to generate high-level learning in online environments are well documented in literature. The concept of cognitive presence emerged from the Community of Inquiry (CoI) framework proposed by Garrison, Anderson, and Archer (2001) to guide the use of online learning environments in support of social constructivist approach to learning. However, little is known about online case-based discussions and their impact on cognitive presence and learning outcomes in online courses. Therefore, the purpose of this project is to implement case-based discussions in an online course and evaluate its impact on students' cognitive presence and learning outcomes related to their grades, learning processes, and satisfaction. A quantitative research method will be used for the evaluation and a qualitative data will be used to strengthen the findings obtained from the quantitative data. The results of this study will enhance the quality of teaching and learning strategies used in the 100% Online Master's Program courses in Instructional Systems Technology (IST) in the College of Education at UNC Charlotte. Additionally, guidelines to use case-based discussions to facilitate cognitive presence in online courses will be shared with UNC Charlotte community and with the larger audience who teach online courses through presentation and publication.

Budget Request Page
January 15, 2019 to May 30, 2020

BUDGET: *Request by budget category. <u>Joint proposers must select one PI to be the lead and one department to receive this allocation</u>.*

Lead Principal Investigator<u>: Ayesha Sadaf</u>

Principal Investigator 800#: <u>961467</u>

Title of Project: <u>Examining the Impact of Case-Based Discussions on Student's Cognitive</u>

<u>Presence and Learning Outcomes in Online Courses</u>

Allocate operating budget to Department of: <u>Educational Leadership</u>

Fiscal Year One (January 15, 2019 to May 30, 2019)		
Faculty Stipend	Paid directly from Academic Affairs fund on May 15, 2019	$3,850 for Dr. Sadaf
911250	Graduate Student Salaries	
911300	Special Pay to Faculty other than Grantee	
915000	Student (Undergraduate or Graduate) Temporary Wages	
915900	Non-student Temporary Wages	
920000	Honorarium (Individual(s) not with UNCC)	
921160	Subject Incentive Fee	
925000	Domestic Travel	
926000	Foreign Travel	
928000	Communication and/or Printing	
930000	Supplies	
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Contracted Services	
Year One Subtotal		

Lead Principal Investigator: <u>Ayesha Sadaf</u>

Fiscal Year Two (July 1, 2019 to May 30, 2020)

Faculty Stipend	Paid directly from Academic Affairs fund on May 15, 2020	$3,850 for Dr. Kim
911250	Graduate Student Salaries	$3,750
911300	Special Pay to Faculty other than Grantee	
915000	Student (Undergraduate or Graduate) Temporary Wages	
915900	Non-student Temporary Wages (see PD-17)	
920000	Honorarium (Individual(s) not with UNCC)	
921160	Subject Incentive Fee	
925000	Domestic Travel	$2,000 ($1,000 for Dr. Sadaf; $1,000 for Dr. Kim)
926000	Foreign Travel	
928000	Communication and/or Printing	
930000	Supplies	
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Contracted Services	
Year Two Subtotal		
TOTAL FUNDS REQUESTED (Year One + Year Two)		**$13,450**

Budget Narrative

Faculty Stipends ($7,700)

The budget includes summer stipend support of $3,850 for the Principal Investigators, Dr. Ayesha Sadaf and Co-Principal Dr. Stella Kim, one in each summer (2019-2020). This summer salary will be used to support faculty to analyze data collected during the 2019- 2020 school year, to write a manuscript to be submitted to *The American Journal of Distance Education*, and to prepare to present their study.

Travel – Domestic ($2000)

Additionally, $1000 for each faculty is requested to cover the expenses associated with the dissemination (publication and presentation) of findings at the AERA's 2020 annual conference.

Graduate Assistant Stipend ($3,750)

We are requesting $3,750 for a graduate assistant who will be responsible for helping with coding the data, analyzing the data, and writing the manuscript to be submitted for publication. This would allow the PIs to pay a graduate student for 200 hours at $18.75 (the current rate for graduate students in the College of Education) to assist with the data collection, analysis, and writing the manuscript.

UNC CHARLOTTE

CATO COLLEGE *of* EDUCATION

Office of the Dean
9201 University City Blvd., Charlotte, NC 28223-0001
(704) 687-8722, www.uncc.edu

October 29, 2018

Scholarship of Teaching and Learning Grants Committee
Center for Teaching and Learning
UNC Charlotte
9201 University City Boulevard
Charlotte, NC 28223

Dear Review Committee:

I am pleased to recommend the Scholarship of Teaching and Learning Grant proposal, *Examining the Impact of Case-Based Discussions on Student's Cognitive Presence and Learning Outcomes in Online Courses*. This project has the potential to improve the quality of online teaching and learning in the Cato College of Education and across campus, at UNC Charlotte and nationally. Led by Drs. Sadaf and Kim, this project seeks to examine the impact of case-based discussions on students' cognitive presence and learning outcomes through the use of quantitative research methods. The project leads will share the information gained with faculty on campus by offering workshops. The guidelines for online instructors using case-based discussions in online courses to guide the improvement of online discussion strategies would benefit instructors throughout this department and college. This project also provides opportunities for our faculty to collaborate with the Distance Education Office and the Center for Teaching and Learning to share expertise in the area of student cognitive engagement and student learning outcomes in online environments.

Dr. Sadaf has published several papers related to online teaching and learning strategies and how they contribute to students' cognitive presence. Excellence in online teaching is her passion and she continues to search for excellent teaching strategies and models that will be effective in the classroom and can be adapted in multiple online courses. I highly recommend this project. It will assist in adding to our knowledge base about quality online teaching and learning strategies. The project faculty are well equipped to carry out the project while informing the college, university and UNC System. I am fully supportive of this effort.

Sincerely,

Ellen McIntyre, Dean
Cato College of Education

IV. Project Narrative

A. Specific Aims

1. **Purpose** - More than a quarter of higher education students are enrolled in at least one online course (Allen & Seaman, 2016). At UNC Charlotte, the number of online courses has more than doubled in the past five years. Given this rapid growth of online education, ensuring the quality of online course design has gained considerable concern. Asynchronous online discussions have caught attention of educators and researchers in facilitating deep and meaningful approaches to learning. Although achieving high-levels of learning is often the goal of online discussions, studies have noted that the majority of students' discussions reflect lower levels of cognitive presence (Rourke & Kanuka, 2009). Case-based discussions have the potential to enhance learning in online courses through application of real-world scenarios across different disciplines. Therefore, the aim of this project is to examine the use of case-based approach to guide the improvement of online instructional delivery in the online master's program in Instructional Systems Technology (IST) in the College of Education at UNC Charlotte.

2. **Objectives** - The specific objectives to be achieved are as follows:
   i. Examine the strength of association between cognitive presence and perceived learning outcomes, discussion grade, and perceived satisfaction in online case-based discussions.
   ii. Determine differences between non-case-based discussions and case-based discussion on the four phases of cognitive presence.
   iii. Explore a relationship between students' perception of cognitive presence and their level of cognitive presence in online case-based discussions.

iv.   Make recommendations for using case-based discussions to facilitate cognitive presence in online courses at UNC Charlotte.

3. **Research Questions** - The following research questions will guide this study:

   1. What is the relationship between cognitive presence and perceived learning outcomes, discussion grades, and perceived satisfaction in case-based and non-case-based discussions?

   2. What are the differences between case-based and non-case-based discussions approaches in terms of the strength of cognitive presence and perceived learning outcomes, discussion grade, and perceived satisfaction?

   3. Is there a relationship between students' perception of cognitive presence and their cognitive presence in case-based and non-case-based discussions?

4. **Rationale** - The overarching goal of this project is to improve the quality of online student learning. This project will advance that goal by examining case-based discussions that facilitate cognitive presence to support high-level learning processes and outcomes in online courses. Instructors who consider using case-based discussion in their online courses may use this knowledge to guide students to high levels of cognitive presence. Instructional designers may use this knowledge to recommend best practices on online course design. Administrators may use these results to set aside funding for training of instructors/instructional designers to design successful online discussions. Bringing together these points of view will help improve the quality of online student learning outcomes.

5. **Impact** - This study has the potential to impact all UNC Charlotte students who take online or hybrid courses. Case-based approach has great potential for engaging students

in disciplinary content and understanding how this approach in online courses impact student cognitive presence and learning outcomes may inform the design of online courses at UNC Charlotte and elsewhere. This may improve high level learning in online courses throughout UNC System.

B. Literature Review

Given the recent rapid growth of online education, identifying "best practices" for facilitating student learning and cognitive engagement in online environments has gained considerable interest (Nistor & Neubauer, 2010; Patterson & Mcfadden, 2009; Sadaf & Olesova, 2017). Studies have reported the effectiveness of asynchronous online discussions, specifically, case-based discussions to increase students' interactions between each other (Ertmer & Koehler, 2014; Tawfik, Giabbanelli, Hogan, Msilu, Gill, & York, 2018). Case-based discussions are the type of discussion that can introduce students to real-world scenarios where they can exchange opinions and interact with each other to find solutions to the problem in the case. Yew and Schmidt (2012) suggested that case-based discussions introduce students to diverse perspectives and enrich the learning experience by promoting understanding, reflection, elaboration, and clarification. Online case-based discussions have the potential to enhance high-level learning in online courses through application of real-world scenarios across different disciplines (Ertmer & Koehler, 2014; Sadaf & Olesova, 2017).

The importance of cognitive presence to generate higher-level learning in online environments has been widely reported in literature (Garrison, Anderson, and Archer 2001; Rourke and Kanuka 2009). Garrison, Anderson, and Archer (2001) defined cognitive presence as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry" (11). The concept of cognitive

presence emerged from the Community of Inquiry (CoI) framework proposed by Garrison, Anderson, and Archer (2000) to guide the use of online learning environments in support of social constructivist approach to learning. CoI is grounded in the Practical Inquiry Model (PIM), which describes four levels of cognitive presence that can be observed in students' online discussion postings: (1) Triggering—becoming aware of a problem through initiating the inquiry process, (2) Exploration—exploring a problem by searching for relevant information and offering explanation, (3) Integration—interpretations/construction of possible solution, and (4) Resolution—applying or defending potential solutions with a new thought/idea.

Researchers suggest that instructional strategies like case-based instruction in relation to the levels of cognitive presence can help in facilitating high level learning (Darabi et al. 2011; Hosler & Arend, 2013). For example, Richardson, Sadaf, and Ertmer (2012) found that discussions that require students to respond to a scenario/case to create a solution was influential in generating high levels of cognitive presence. Similarly, Richardson and Ice (2010) compared three discussion strategies and found higher levels of cognitive presence for case-based strategy compared with debate and open-ended discussions. In a meta-analysis on effectiveness of online discussion strategies, Darabi, Liang, Suryavanshi, and Yureki (2013) stated that students usually respond better when they are engaged in a purposefully structured and strategic online discussion, especially when discussion tasks involved an application scenario such as a case.

Although online case-based discussions have the potential to enhance high-level learning among students (Ertmer & Koehler, 2014; Richardson and Ice, 2010), research related to their impact on student cognitive presence and their overall learning outcomes is limited.

C. Methods

Data Collection

Three data sources will be used in this study: transcript analysis of online discussions, students' responses to a CoI survey, and students' grade on each discussion. The data will be collected over three semesters from four sections of "Instructional Design" course during Fall 2018, Spring and Fall 2019. "Instructional Design" is a graduate course required for master and graduate certificate students in Instructional Systems Technology at the College of Education. This course is an online course and students are required to participate in 15 weekly online discussions. The course can roughly be divided into two parts. The first part is devoted to introducing the basic components of instructional design. Then, the second part is to apply the acquired knowledge to several cases, and to come up with an appropriate instructional design for those cases.

Measurement/Instrument

Transcript analysis of weekly discussions will be conducted to measure cognitive presence for each phase using CoI's cognitive presence coding scheme and will be transformed into quantitative data (frequencies). Two graduate assistants will perform the transcript analysis independently after being trained with the coding scheme. Prior to actual coding, the inter-rater reliability will be computed to assess the level of a coding agreement between the two coders. Any disagreement will be resolved through a discussion between the coders and the PI to reach an agreement on the final code. The number of messages assigned into each phase will be counted for each student. Among 15-week discussions, there will be three case-based discussions and twelve non-case-based discussions. Two separate transcript analyses will be conducted: one for case-based and the other for non-case-based discussions.

The 12-item Community of Inquiry (CoI) framework survey instrument will be administered to the approximately 70 students at the end of each semester in Fall 2018, Spring

2019, and Fall 2019 using Qualtrics Survey. Each student will be asked to respond to two sets of CoI survey questions: one with a reflection on their case-based discussions experience and the other on the non-case-based discussions. Students' perceived learning achievement and satisfaction will also be measured by adding two survey items at the end of the CoI. The CoI survey was initially developed to measure students' perception of cognitive presence, teaching presence, and social presence (Arbaugh et al., 2008). Since the focus of this study is cognitive presence, only the12 items that measure cognitive presence perceptions will be used. The items employ a 5-point Likert-type scale, with 1 = strongly disagree and 5 = strongly agree. Simple demographic information will also be collected such as gender, age, prior experience with online courses, and the program to which a student belongs. In addition, qualitative data will also be sought using open-ended questions such as "What went well in case-based discussions?" in order to corroborate the findings obtained from the quantitative data.

Students' grade to each discussion will also be collected. There will be 12 grades on non-case-based discussions and 3 grades on case-based discussion for each student. Each grade has a minimum score of 0 and a maximum score of 10, and the total scores on the discussions contribute approximately 20 percent of the final course grade.

Analysis

Research Question 1. Is cognitive presence associated with perceived learning outcomes, discussion grade, and perceived satisfaction?

A partial correlation will be computed to examine the strength of association between cognitive presence and perceived learning outcomes, actual discussion grade, and perceived satisfaction after controlling the demographic variables including gender, age, prior experience with online courses, and the program. A total number of messages coded as cognitive presence

12

will be used as "cognitive presence" variable and students' rating to perceived learning outcomes and satisfaction will be used as "perceived learning outcomes" and "perceived satisfaction" variables, respectively. Also, the actual grades for weekly discussions will be used as "actual grade" variable.

Then, a stepwise multiple regression approach will be used to examine which phase of cognitive presence contributes most to perceived learning outcomes, actual grade, and perceived satisfaction. The scatter plots of residuals will be examined to check the normality assumption, linearity, and homoscedasticity.

Research Question 2. Are there differences between case-based and non-case-based discussions approaches in terms of the strength of cognitive presence and perceived learning outcomes and discussion grade?

There are four scores associated with each phase of cognitive presence which are most likely to be correlated with the other phases. Multivariate analysis of variance (MANOVA) will be used to simultaneously analyze the linear combination of dependent variables. In this study, there will be two sets of students' responses to the same set of questionnaires for non-case-based and case-based discussions, respectively. A one-way repeated-measure MANOVA will be performed to determine differences between non-case-based discussions and case-based discussion on the four phases of cognitive presence. The normal Q-Q plots will be inspected to ensure the multivariate normality of the four dependent variables: triggering, exploration, integration, and resolution.

If a statistically significant difference is found, a follow-up test will be conducted using discriminant analysis to identify which dependent variable (which phase of cognitive presence) is most responsible for the difference between case-based and non-case-based discussions.

To examine the difference in perceived learning outcomes and discussion grade between case-based and non-case-based discussions, a paired t-test will be performed for each variable separately.

Research Question 3. Is there a relationship between students' perception of cognitive presence and their level of cognitive presence?

First, exploratory factor analysis using an oblique rotation will be run for the CoI survey items to extract four factors associated with each of the four phases of cognitive presence. Second, after checking the data structure, the structural equation modeling will be employed to confirm the hypothesized relationships between cognitive presence (data from transcript analysis) and students perceived cognitive presence (CoI survey responses) with respect to the four phases. One of the hypothesized relationships that will be tested in this study is presented in Figure 1. All statistical tests and analyses will be performed using the R software, version 3.0.1.
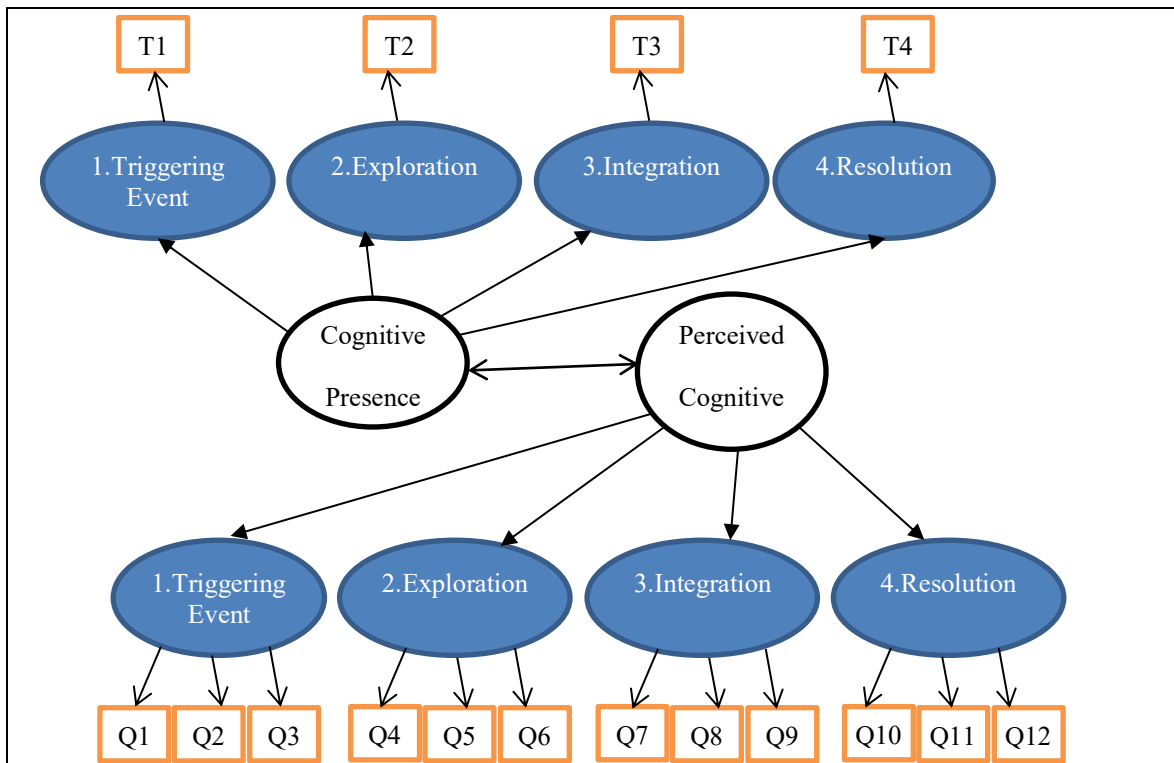

Figure 1. Model of the relationships between cognitive presence and perceived cognitive presence.

D. Evaluation

Evaluation for each of the project goals is described below.

Project Objectives	Statistical Evaluation Methods	Instruments	Variables
1. Examine the relationship between cognitive presence and perceived learning outcomes, discussion grade, and perceived satisfaction.	• Partial correlation • Stepwise multiple regression	• CoI survey • Transcript analysis of the discussion postings	• Perceived learning outcomes/ perceived satisfaction from the CoI survey questions • Grades for each discussion • Cognitive presence measured by transcript analysis
2. Compare case-based and non-case-based discussions approaches in terms of the strength of cognitive presence and perceived learning outcomes and grades	• One-way repeated-measure MANOVA • Discriminant analysis • Paired t-test	• CoI survey • Transcript analysis of the discussion postings	• Perceived learning outcomes from the CoI survey question • Grades for each discussion • Cognitive presence measured by transcript analysis
3. Explore the relationships between perceived and actual cognitive presence with respect to four phases	• Exploratory factor analysis • Structural equation modeling	• CoI survey • Transcript analysis of the discussion postings	• Perceived cognitive presence from the CoI survey questions • Cognitive presence measured by transcript analysis

4. Make recommendations for using case-based discussions to facilitate cognitive presence in online courses at UNC Charlotte	• Descriptive statistics including a frequency table • Workshop or presentation at CTL	• The level of satisfaction who attend a presentation through a CTL survey • Number of people who attend a presentation	• CTL survey

E. Knowledge Dissemination

Researchers will disseminate findings in multiple ways. Internally, online case-based discussion strategies will be shared with the faculty in the university through the center for teaching and learning (CTL) and the office of Distance Education. Additionally, Drs. Sadaf and Kim would present at the annual SoTL showcase at UNC Charlotte and offer workshops on online case-based discussion strategies for faculty through UNCC CTL. Externally, the findings will be shared through presentation at a national conference (Online Learning Consortium and American Educational Research Association) and through publication with relevant journals (*American Journal of Distance Education* or *Online Learning Journal*).

F. Human Subjects

A Human Subjects Protocol application for the Institutional Review Board (IRB) will be submitted by the beginning of December 2017 semester if this SOTL proposal is funded. To ensure for the protection of human subjects, UNC Charlotte IRB approval will be sought prior to the data collection.

G. Extramural Funding

We will use the results to support a request for funding from the Fund for the Improvement of Postsecondary Education, U.S. Department of Education.

H. Timeline

The following is a timeline for the project:

Timeline	Research Activities
Fall 2018	• Survey Development • IRB approval • Data collection
Spring 2019	• Data Collection
Summer 2019	• Fall & Spring Discussion Data Analysis
Fall 2019	• Data Collection
Spring 2020	• Survey Data Analysis
Summer 2020	• Writing the Manuscript
Fall 2020	• Disseminate findings

References

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