PREPARING TOMORROW'S TEACHERS USING INNOVATIVE DIGITAL TECHNOLOGIES

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Abstract

Problem: *With an estimated 200,000 teacher candidates (US Department of Education, 2011), completing teacher preparation programs every year, the need to research well-defined teacher preparation practices is vital to strengthening the knowledge and experience base of prospective teachers and to improve the achievement scores of students in their first year of teaching.* ***Research Questions:*** *In what ways does the use of* Instructional Strategy Lessons for Educators Series (*ISLES) Secondary eBooks affect teacher candidates' knowledge of instructional strategies?* ***Research Method:*** *The methodology adopted for this study is based on the constant comparative methods based on a phenomenological approach, which explores the contexts of lived experiences that occur within particular learning instance.* ***Data Collection Procedures and Analysis:*** *Multiple sources were collected and analyzed, providing for methodological triangulation. Findings from each data set were compared to each other to locate either patterns or inconsistencies. The data were analyzed in order to answer the research question.* ***Findings:*** *Three data sets were collected. Although the pre/posttest response rate was low (26% pretest and 30% posttest) the teacher candidates demonstrated an increase in use of instructional strategy terminology at a ratio of 1:14. The second data set included responses to ten consistent reflective questions per each of the five eBook modules with a 100% participation rate. As the responses were coded, three patterns emerged from the data: 1) the teacher, which included personal or affective comments about the teacher and/or appraisal of the teacher's planning; 2) the students, which included students' affective reactions to instruction; and 3) the instructional practices, which included affective comments about the teachers' integration and/or use of instructional strategies. The third data set included responses to the interactive eBook widgets. The completion rate of interactive widgets was seventy-six percent (76%). The overall tone of the teacher candidates' comments was positive and detailed the advantages of using the interactive eBook.* ***Conclusions/Recommendations:*** *The study provides relevant information on the value of developing mobile digital books that emphasize the three subcategories of a community of inquiry by designing materials that include; 1) teaching presence; 2) cognitive presence; and 3) social presence to foster teacher candidates' engagement while gaining knowledge of instructional practices. The findings from this study demonstrate that teaching, cognitive, and social presence structured supports provided within the modules helped to increase teacher candidates' knowledge of instructional strategies.*

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Introduction

What does the future of teacher preparation in business education look like? Historically, teacher preparation programs have focused primarily on improving teacher quality as opposed to improving teaching practices (Hiebert & Morris, 2012). This approach emphasizes hiring the "right" teachers that embody teacher-like characteristics (content knowledge, dispositions, and motivation) that impact student learning (Kennedy, 2010). Although little data can substantiate the effectiveness of this approach, support for this method of preparing teacher candidates continues, as noted in a survey conducted by Louis Harris and Associates that found 55 percent of Americans chose the quality of teachers as "the greatest influence on student learning (NEA, 1999 as cited in Roth & Swall, 2000, p. 3)." As Dennis Roekel, President of the National Education Association, reasoned "We need to take the lead in recruiting and training teacher candidates. Students need and deserve our best efforts and our best educators" (U. S. Department of Education, 2011, p.9).

With an estimated 200,000 teacher candidates (U. S. Department of Education, 2011) completing teacher preparation programs every year, the need to research well-defined teacher preparation practices is vital to meeting the demand for qualified teachers in the United States. To this end, the authors present the nationwide reform movement from the Office of Innovation and Improvement in the United States Department of Education. The authors were one of a select few of teacher preparation programs to participate in the Teacher Quality Partnership Grant. The goal of the Teacher Quality Partnership (TQP) grant project was intended to strengthen the knowledge and experience base of prospective teachers and to improve the achievement scores of students in their first year of teaching.

Literature Review

The East Carolina University TQP Secondary Teacher Education Reform began in the summer of 2012 when faculty from the College of Education and the College of Arts and Sciences collaborated with teachers from a high school in Pitt County to form disciplinary teams to create model curriculum units. The initiative continued in summer 2013, to learn how to use iAuthor software to create electronic books. In the fall semester 2014 as part of East Carolina University's curriculum reform, the Instructional Strategy Lessons for Educators Series (ISLES) Secondary modules were developed to prepare teacher candidates within a virtual learning environment. The reform initiative was unique from the onset as it was a collaborative effort between secondary teachers, post-secondary faculty, and instructional designers. The development phase of the secondary ISLES initiative within the business education curriculum program spanned two years. As part of the reform, university faculty and high school teachers participated in a summer institute to allow for collaboration among the team to review video segments, research verified instructional practices, and construct electronic books with digital interactive assessments.

One member of the team also participated within the TQP Video Grand Rounds initiative. Building on the strengths of what was learned from (Herbert & Wright, 2003) the "grand round" initiative included discussing a patient's case as in the medical model. In addition the Teacher Quality Enhancement project (Crews & Zenger, 2006) involved "rounds" which allowed teacher education interns to observe a variety of master teachers and debrief through reflective discussion. In the same way the TQP Video Grand Rounds initiative provided teacher candidates in the early experience practicum course to view a series of video clips of classroom instruction and debrief through video conference sessions with the university professor to discuss elements of instructional strategies, quality instruction, and creation of a positive learning environment. Similar to the way the medical profession developed laboratories and clinical settings (Ball & Forzani, 2010), the conceptual framework for developing the ISLES S eBook's was based on Community of Inquiry (CoI) (Garrison, Anderson, & Archer, 2000), which reasons that learning occurs within the community through social interaction between three elements: cognitive presence, social presence, and teaching presence. The concept of CoI is comprised of teachers, students, and the environment as key participants in the educational process, but stems from social dimensions within social human behavior theory (Bourdieu, 1977; Foucault, 1980; Giddens, 1984; Lave, 1988; Vygostsky, 1978). The CoI framework builds on Bandura's Social Cognitive Theory (1986), which suggests that learning occurs in a social context. The interaction between the person, environment, and learned behavior impacts the level of learning and transferability of knowledge to practice. These theories suggest to educators that learning is not an individualized process but requires interactions and engagement. Bandura (1977) asserts that

> learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action (p. 22).

Thus, the ISLES modules included: 1) mission, 2) first impression, 3) exploration, 4) context for learning, 5) abbreviated lesson plan, 6) think about, 7) video clips, 8) expanded lesson plan, 9) student work sample, and 10) reflection to offer teacher candidates the social context in which learning is fostered and opportunities to develop and apply skills are recognized.

To further emphasize the social construct required for learning, which emphasizes the role and nature of interaction with others and to enhance connections with existing knowledge and build opportunities to apply instructional practices (Bryant & Bates, 2015), the ISLES modules were developed in a digital format using iAuthor software technology. The mobile digital format was an ideal method for

teacher preparation for learning content, sharing fieldwork experiences, and for recording real-time observations and reflections (Johnson et al., 2010). As with all digital environments, the challenge is to design CoI that combines the elements of cognitive presence, social presence, and teaching presence. If, however, educators realize the potential of digital communication technologies to engage students, technology tools can be integrated to successfully create a collaborative environment. For example, today's eBook technologies provided unique features and capabilities that are invaluable for learners with various learning needs (Weber & Cavanaugh, 2006). A growing body of research in teacher preparation programs suggests that knowledge construction could be fostered through collaboration and real-time interaction to enhance, student autonomy in learning and attain higher levels of metacognition (Herrington, Mantei, Herrington, Olney & Ferry, 2008). This research provides the conceptual framework that identifies the elements that are crucial prerequisites for a successful teacher preparation program through the use of digital technologies as a mechanism for creating authentic learning experiences within a CoI.

The interactive capabilities of eBook programs provide students with the ability to act by drawing information outside of their primary knowledge (Siemens, 2005). The interactive eBooks provide highlighting and note taking options, as well as the ability to add creative drawings within the eBooks. In addition, when creating an eBook, authors can embed widgets that allow for interactive activities and formative assessments to measure student comprehension. As these new technologies continue to be developed and refined, new ways to deliver content and develop social constructs are provided albeit hubs of well-connected people who are able to foster and maintain a flow of knowledge throughout the teacher preparation process (Kleiner, 2002). Therefore, these technologies have implications for both research and practice.

Research Design and Methodology

The methodology adopted for this study is based on the constant comparative method. This approach is based on the work of (Glaser & Strauss, 1967) using an emergent coding system for the three data sets: pre/posttest instructional strategy question, eBook reflective questions, and interactive eBook widgets. The constant comparative method is based on a phenomenological approach which explores the contexts of lived experiences that occur within particular learning instance. As Maykut and Morehouse (1994) suggest, "…words are the way that most people come to understand their situations; we create our world with words; we explain ourselves with words; we defend and hide ourselves with words" (p18). Thus, the objective was to explain the social process of how the use of the Secondary ISLES digital eBooks within a community of inquiry impacted the teacher candidate knowledge of instructional strategies and transferability to instruction.

Procedures

Undergraduate Teacher Candidates (TCs) enrolled in the senior level methods of teaching career and technical education course were provided the Secondary ISLES modules reform initiative to engage them in the use of interactive eBooks within a CoI. In fall 2014, 10 undergraduate teacher candidates and in spring 2015, 17 undergraduate TCs participated in the Secondary ISLES model study. The TCs were provided the opportunity to receive an iPad with the digital eBooks installed or TCs could opt to use personal iPads and download the Secondary ISLES eBooks from a designated server. Previous versions of the methods course did not contain the

Secondary ISLES modules rather the course included text-based descriptions of various instructional strategies. At the onset of the study, TCs were provided a pretest to determine the initial level of knowledge of instructional strategies prior to use of the Secondary ISLES eBooks. Following the pretest the TCs were assigned chapters to complete within the Secondary ISLES eBooks. The chapters included: 1) organizers, 2) question and review, 3) grouping, 4) concept learning, 5) assessment, and 6) Career and Technical Student Organizations (CTSOs). Each of the digital eBook chapters included the following framework; 1) mission, 2) first impression, 3) exploration, 4) context for learning, 5) abbreviated lesson plan, 6) think about, 7) video clips, 8) expanded lesson plan, 9) student work sample, and 10) reflection to offer teacher candidates the social context in which learning is fostered and opportunities to develop and apply skills are recognized. Figure 1 provides an example of some of these features.

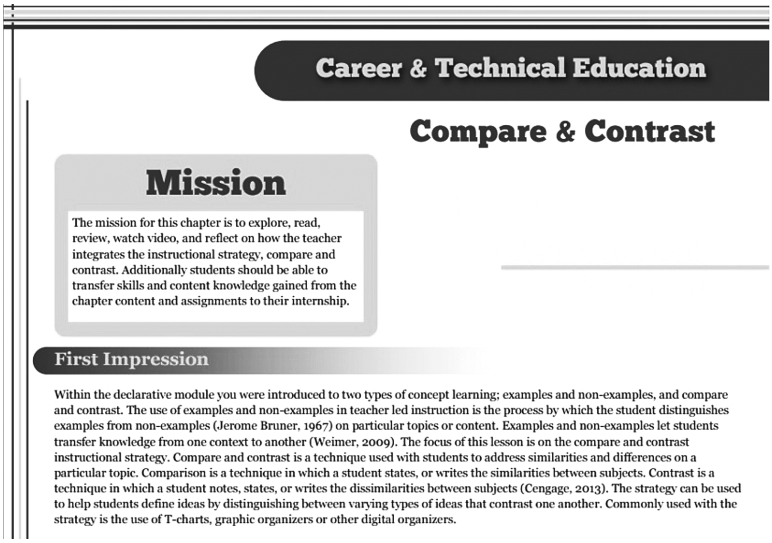

Figure 1: Example of concept learning, compare and contrast chapter mission and first impression

The TCs progressed through the chapters within the eBooks reading about the instructional strategies, exploring additional research articles on the topic, and examining an abbreviated lesson plan followed by reviewing the context of the classroom for the video clips. The selected video clips were based on a series of clinical teacher's instruction that reflected grade level, content and alignment to particular instructional strategies. Once TCs watched the video clips an expanded lesson plan was provided, as well as a student work sample product followed by reflection question protocol and various interactive widgets to promote communication and interaction among TCs. Utilizing Bookry Widgets such as quiz builder, Sketchpad, iDraw, Drag & Drop, Twitter, and VoiceThread the TCs were able to interact in an online community of inquiry. Figure 2 provides an example of one of these components.

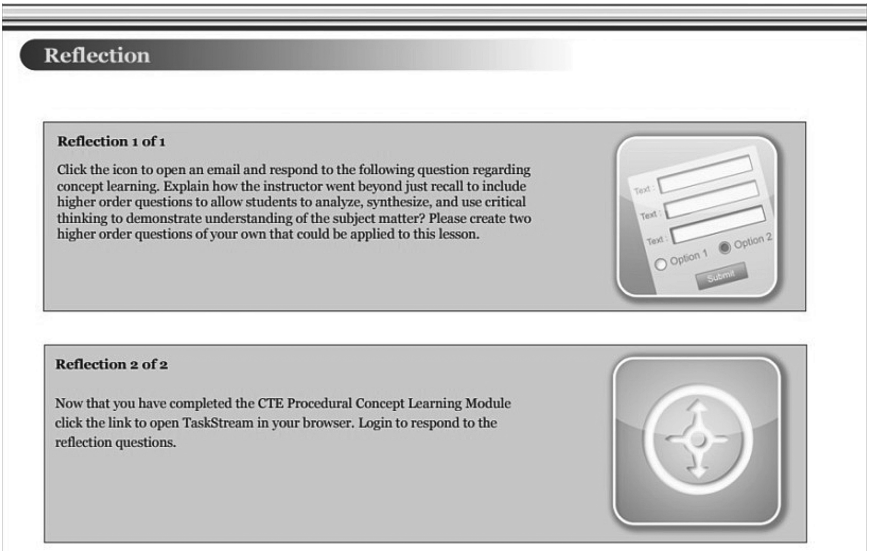

Figure 2: Example of Concept Learning widget reflection

The reflection question protocol consisted of 10 consistent questions with additional questions added for specific chapters (See Appendix A). At the conclusion of the course, the posttest was administered to determine the TCs level of knowledge of instructional strategies following the integration of the Secondary ISLES eBooks.

Data Collection and Analysis

Documents collected throughout the study included three data sets; 1) pretest/ posttest instructional strategy question, 2) eBook reflective questions, and 3)

interactive eBook widgets that focused on the TCs' learning experiences within a community of inquiry.

The constant comparative approach involved an initial analysis of the eBook reflective questions to produce a list of patterns (Glaser & Strauss, 1967; Lincoln & Guba, 1985) and coding the patterns into categories within the reflection responses. The categories were then used to code patterns within each of the data sets. In the constant comparative method (Glaser& Strauss 1967; Taylor & Bogdan, 1984) the researcher simultaneously codes and analyzes data in order to develop categories; by continually comparing specific patterns found in the data, the researcher then refines these categories to identify relationships to answer the research question. Multiple sources were collected and analyzed, providing for methodological triangulation. Findings from each data set were compared to each other to locate either patterns or inconsistencies within the data as the research question was answered. The data were analyzed in order to answer the following qualitative research question.

Findings

RQ1: In what ways does the use of Secondary ISLES eBooks affect teacher candidates' knowledge of instructional strategies?

Twenty-six percent (26%) of the TCs completed the pretest and thirty percent (30%) completed the posttest. Although the pre/posttest response rate was low the teacher candidates demonstrated an increase in use of instructional strategy terminology at a ratio of 1:14. For every written use of an instructional strategy on the pretest (1), the TC used instructional terminology on the posttest at an increasingly higher rate of (14) times. The pretest responses included general descriptors of instructional practices whereas the posttest revealed specific use of instructional strategy terminology. For example, some of the terms used to describe instructional strategies in the posttest included homework and practice, groups, question and review, scaffolding, graphic organizers, collaboration, project-based learning, and games.

The second data set included responses to 10 consistent reflective questions per each of the 5 eBook modules. As the responses were coded, three patterns emerged from the data: 1) *the teacher*, which included personal or affective comments about the teacher and/or appraisal of the teacher's planning; 2) *the students*, which included students' affective reactions to instruction; and 3) the instructional practices, which included affective comments about the teachers' integration and/or use of instructional strategies. Table 1 presents all reported outcomes and their respective classifications into the patterns.

Table 1

Patterns of eBook reflective question responses

	Organizers	Concept Learning	Assessment	Question and Review	Groups
The teacher	33%	18%	19%	27%	23%
The student	7%	8%	5%	3%	9%
The instructional practices	60%	74%	76%	70%	68%

Note: These numbers represent the percentage of the overall total from each session's coded responses.

Each of the eBook modules were assigned at specific increments throughout the semester. Following the completion of each eBook module TCs completed the eBook reflection questions and eBook widgets.

The Teacher

The TCs eBook reflection responses to the teacher were lower than the instructional practices yet higher than the student reflective responses. TCs often commented that "the teacher did a great job of XYZ." A higher number of TCs commented on the use of clear and direct instructions. For example, one TC commented, "The teacher gave really good details on what he was expecting from the compare/contrast activity…and connecting what they were getting to learn to prior knowledge." Another element that was consistently commented on by TCs was the teacher preparation in planning for instruction. For example, one TC stated, "The lesson plan prepared was well organized…at the beginning of the class the objectives were covered so that they knew what they would be doing", whereas a majority of the TCs noted that the teacher "walked around the room monitoring student work." One TC noted, "the teacher is constantly walking around the room to assess student progress…she takes cues from the informal assessment to clarify expectations."

The Student

The lowest percentage on the reflection was with the TCs recognition of the students' affective reactions to instruction (7%, 8%, 5%, 3%, and 9%). TCs commented on the high school students' response to the teachers' instructional method, for example one student wrote "She asked them what they thought… and by the end of the examples, the students were able to more effectively understand the meaning and purpose of the content being taught," while another TC responded "the students knew exactly what to do and how to do it; this was a great example of classroom management." Although most of the comments included positive reactions to instruction, some TCs noted when students had difficulty understanding instruction. For example, one TC commented, "I'm not sure if the students really understood the information" while another commented

"several students struggled with the worksheet."

The Instructional Practices

The eBook reflection data indicates TCs overwhelmingly discussed instructional practices (60%, 74%, 76%, 70%, and 68%) respectively. As illustrated below in the excerpts from the eBook reflection questions, TCs provided detailed instructional strategies specific to the video segment and supplemental materials provided within the eBook. For example, one TC stated, "The teacher helped students make sense of what was being taught by providing a graphic organizer, giving explanations, questions/answers, and relating real life examples," while another describe how the teacher in the video segment taught the class and wrote "The teacher started off his class by calling on prior knowledge that was learned in the class that week. He used question/answer instructional strategy to engage students in the review of information to help check for understanding…He implemented cooperative learning assignment that divided the class into groups to conduct research so that students could complete the T-chart graphic organizer."

For each set of eBook reflections on organizers, concept learning, assessment, question and review, and groups, TCs consistently used the instructional strategies presented within the modules. Instructional terminology used within the TCs responses include but are not limited to: 1) higher order questions; 2) real life examples; 3) examples and non-examples; 4) independent and guided practice; 5) cooperative learning and groups; 6) modeling and demonstrations; 7) formative and summative assessment; 8) homework and practice; 9) direct instruction; and 10) research, analysis, and synthesis.

The third data set included responses to the interactive eBook widgets. The completion rate of interactive widgets was seventy-six percent (76%). The overall tone of the teacher candidates' comments was positive and detailed the advantages of using the interactive eBooks. One teacher candidate commented, "They offered definitions, examples, advantages and disadvantages to concepts and offered visuals." Another TC commented, "They were easy to follow and presented information in a scaffolding way that helped make learning easier." Sometimes the TCs commented on the video clips. For example, one candidate wrote, "I liked watching the video segments. They really helped to reinforce concepts with real life examples to watch." Figure 3 provides a sample of Twitter reflections and Figure 4 provides a glimpse of a brainstorming session.

Discussion and Conclusions

The study provides relevant information on the value of developing mobile digital books that emphasize the three subcategories of a community of inquiry by designing materials that include; 1) teaching presence; 2) cognitive presence; and 3) social presence to foster teacher candidates' engagement while gaining

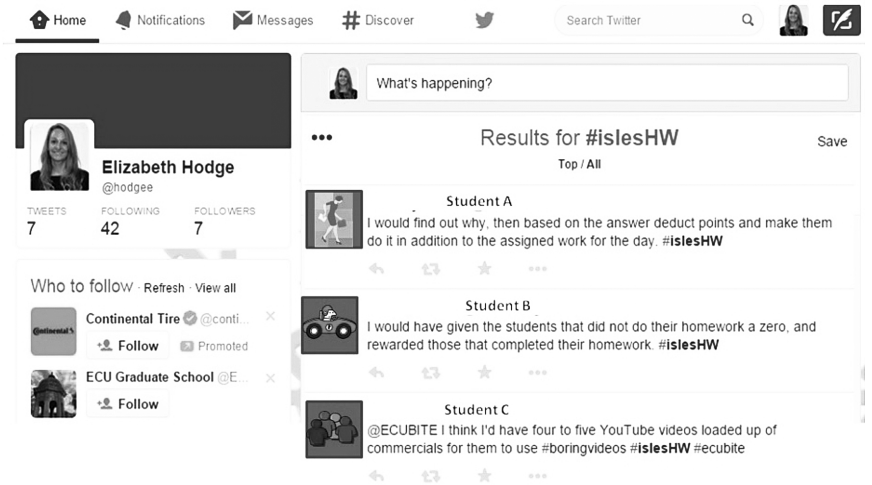

Figure 3: Example of Twitter reflection: Reflect on how the teacher handled the situation that students didn't complete required homework. Follow the Twitter feed at https://twitter.com/ECUBITE and compose a tweet to the following question. How would you handle the situation? Include the hashtag #islesHW in your response.

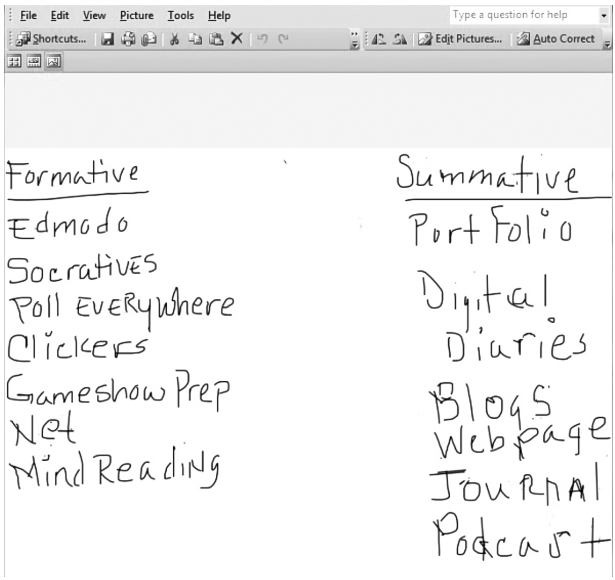

Figure 4: Formative and Summative Assessment: Brainstorm how you would use games as assessments. Share your ideas with the professor using Sketchpad.

knowledge of instructional practices. What sets this initiative apart from others was the collaboration between secondary teachers, post-secondary faculty, and instructional designers in determining what criterion was needed within the eBooks to create a CoI.

The eBook modules established a teaching presence via; 1) mission, 2) first impression, 3) exploration, 4) context for learning, 5) abbreviated lesson plan, 6) think about, 7) video clips, 8) expanded lesson plan, 9) student work sample, and 10) reflection. The collaboration between the secondary and post-secondary faculty allowed designers to determine appropriate instructional strategies to reinforce the special needs of business, marketing, and information technology teacher instructional practices. The 10 original strategies were developed as the focus for eBook development. However, through a review of Career and Technical Education (CTE) curriculum and video segments the team determined that additional instructional strategies should be addressed within the eBooks. The additional components included explicit instruction, opening day strategies, and an understanding of CTSOs. Posttest results demonstrated that teacher candidates found the eBooks valuable. As one TC commented, "The ISLES modules really helped strengthen my knowledge of instructional strategies." As the findings indicate, the directed "content" embedded within the eBooks provided the teaching presence component necessary for teacher candidates to learn instructional practices within a community of inquiry.

The cognitive presence was described as "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000, p. 89). To establish a means of measurement for demonstrating cognitive presence the eBooks scaffold in exploration, think about, and reflective questions. Garrison, Anderson, and Archer (2001) suggested that these measures of cognitive presence are "a means to assess the systematic progression of thinking over time" (Garrison, Anderson, and Archer 2001 as cited in Annard, 2011, p. 40). The five eBook modules were delivered over a specific timeframe throughout the semester. At the conclusion of each module, TCs completed the 10 reflective questions. The authors expected an increase in the three patterns of 1) the teacher, 2) the student, and 3) the instructional practices to be recorded.

Conversely, the findings demonstrated there was not an increase in growth from one eBook module to the next, but rather it varied based on the content covered. Teacher candidate percentage of comments on each of the three categories were relatively consistent throughout each eBook and no pattern emerged to demonstrate an increased level of understanding when trying to measure growth between module one to module five. However, TCs did develop a greater level of knowledge and complexity in their descriptions of instructional strategies. For example, TCs transitioned from using terms like guided practice to describing specific guided practice strategies such as "the teacher used graphic organizers for

students to understand the content being presented." Additional examples include instructional terms such as "modeling, explicit instruction, question and review, cooperative learning, cues, and higher order thinking."

As Van Es and Sherin found that whenbeginning teachers could engage in analyzing videos of classroom lessons, over time, the teachers transitioned from descriptive responses to analytical responses (Van Es & Sherin 2002 as cited in Hiebert, Morris, Berk, & Jansen, 2007). Clearly the barriers to learning, describing and transferring instructional strategies within a classroom context were lessened by the cognitive presence created within the community of inquiry.

The final element within a CoI included within the conceptual framework for the study was social presence. Social presence (Swan, Garrison, & Richardson, 2009) is described as the projection of learners' personal characteristics into a community of inquiry through use of personal and emotional expression, open communication, where learners build and sustain a sense of group around a common task or activity. The use of the eBook widgets in combination with online video conference debrief meetings to discuss modules provided opportunities for teacher candidates to share, interact, and communicate. The findings revealed that throughout the 16 week semester, TCs developed a greater level of social presence through the completion of interactive tasks.

Although the use of interactive widgets produced a higher level of personal reflection on the use of instructional strategies within a specific context in the classroom setting, the inability of TCs to collectively analyze the widget responses the eBook modules created an environment where TCs did not learn from one another's personal experience and knowledge. In our view, to make the learning robust between TCs the use of paired groups using synchronous video conferencing tools would afford for further dialog to take place within a CoI affording for a higher level of knowledge transfer and application to understanding the benefits of particular instructional strategies being integrated into a lesson.

Undoubtedly, obstacles exist in preparing teachers for the reality of classroom instruction. Previous method course offerings for TCs provided text-based instruction on instructional strategies whereas the Secondary ISLES modules included the use of a CoI by designing materials that included; 1) teaching presence; 2) cognitive presence; and 3) social presence to foster teacher candidates' engagement while gaining knowledge of instructional practices. The findings from this study demonstrate that teaching, cognitive, and social presence structured supports increase TCs knowledge of instructional strategies. Additionally, the research examined the ways in which TCs responded to the use of Secondary ISLES eBook modules to create a CoI.

Although the Secondary ISLES modules provided an environment where TCs fostered community, interaction, and challenged them to apply instructional strategies it is evident that further work needs to be done to achieve the optimal goal of preparing prospective teachers to not only understand and apply instructional

strategies but to transfer the strategies at the conditional level of instruction. Therefore, future directions for research include the impact Secondary ISLES eBooks have on a TCs ability to transfer knowledge of instructional practices to instruction.

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Appendix A

Reflection Questions

1. What do you think the teacher did particularly well?
2. What would you do differently with the lesson?
3. How did the instructor provide targeted support for use of vocabulary and/or symbols as well as additional language demand(s)?
4. In the lesson plan you will note that the teacher may have made modifications for students with IEP/504 plans, or ELL. Beyond these there are many reasons why students may struggle in class. What supports would you provide to assist the student(s)?
5. How did the teacher in the video segments help students make sense of what was taught or synthesize learning (e.g., reinforcing major lesson points, conducting an informal assessment, asking students to describe what they had learned)?
6. How did the teacher in the video segments demonstrate the ability to apply the subject matter to real life concepts?
7. In what ways during the video did you observe the teacher taking a leadership role? As you move into your teaching internship how will you take on a leadership role in the classroom?
8. Based on the video you viewed, please comment on the classroom environment (interruptions, disruptions, and behavioral issues).
9. Based on the video, did you find any examples of formative assessment? Explain what the teacher did and why you believe it is an example of formative assessment?
10. If you were the teacher, how would you handle issues with technology?

Secondary Reform Initiative Link:
http://www.ecu.edu/cs-educ/TQP/secondary_cur-reform.cfm