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Re. Final report for paper presented at the American Educational Research Association (AERA)
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A. Research paper entitled “*Examining the Effect of Flipped Teaching Strategy on Preservice Teachers’ Academic Achievement and Self-efficacy in a Face-to-Face Course*”

B. Research problem:

Lecture-based teaching strategy (LB) used for decades as an effective way to help students acquire new knowledge (e.g., Hattie, 2009; Schwerdt, 2009). However, many educators argue that this teaching model is mostly static, passive and not suitable for teacher candidates preparing for extended field experience and careers in teaching. Students reported also that the information delivered during lectures may come too slowly or cover what they already know; other students have trouble taking in information so rapidly, or they may lack the prior knowledge needed to understand the presented content (Goodwin & Miller, 2013).

A growing number of teachers started recently using different teaching strategy through creating flipped or inverted classrooms. This teaching strategy involves moving the lecture content before class and working on homework and hands-on activities during class time. For example, the data from the Flipped Learning Network (2012) indicated that membership on its social media site rose from 2,500 teachers in 2011 to 9,000 teachers in 2012. In the flipped teaching strategy (FB), educators can employ online asynchronous educational video, recorded lectures or readings and spend time in class working on problems or exercises through active, group-based problem solving activities. The learning materials can incorporate multimedia visual representations, such as interactive graphs, photos or animation. During watching the video, lectures or reading the text, students have the chance to control the pace of the multimedia streaming to match their own learning preferences. Students can also watch or listen to recordings of class lectures on their computers, tablets, smart phones, or personal media players outside of class, leaving class time to engage in learning activities that might otherwise assigned as homework (Frydenberg, 2013).

Reports of student perceptions of the FB found to be somewhat mixed, but are generally positive overall. For example, some prior research found that students tend to prefer in-person lectures to video lectures, but prefer interactive classroom activities to lectures (Bishop & Verleger, 2013). Although there is steady increase in the number of teachers who adopt the FB in classrooms, there is little research on the effect of this teaching strategy on preservice teachers. Therefore, the purpose of this study is to examine the implications of the use of flipped

classroom teaching strategy on preservice teachers' learning outcomes, self-efficacy and perception in a technology integration course..

C. Research procedure

First, students in all sections completed demographic and self-efficacy surveys. Second, instructor used the flipped-based method to teach four topics in four consecutive weeks to all sections. In the fifth week, instructor used traditional lecture-based method to teach one topic to all sections. At the end of every week students completed a quiz related to the week's topic and at the end of the fifth week, students completed self-efficacy survey (post). All surveys and learning activities presented and submitted through Blackboard.

D. Summary of findings

The main finding of this study is that the use of the flipped teaching strategy indeed has the potential to help preservice teachers to improve their learning outcomes in the technology integration course. This benefit demonstrated by the statistically significant differences in learning outcomes between students taught by flipped and lecture-based teaching strategies, with the highest scores achieved by students in the flipped condition and the least was in the lecture-based condition. The results of the present study support previous findings produced in the context of other content areas and with different population and provide empirical evidence that validates the flipped teaching strategy to improve students' learning outcomes (Sadaghiani, 2012; Sparks, 2013; Walker, 2011). Specifically, the preservice teachers' test scores improved in all tests after they engaged in flipped teaching activities compared to their test scores after lecture-based activities.

E. Conclusions and recommendations

Assigning multimedia learning materials for students to review outside classroom allows them to learn content at their own pace and permits them to view and listen again to those sections that present important or complex concepts (Gibbons Jf, 1977). This interpretation is consistent with prior cognitive research, which noted the positive effect of allowing students to control the pace or stream of learning content. If students lack control over the pace of the learning content, this might burden their limited cognitive resources, especially learning from multimedia materials. According to cognitive theory of multimedia learning (CTML), the human cognitive system can process only small portions of the large amounts of visual and auditory stimuli received. Unlike processing printed text, learners in formal educational contexts typically do not have the opportunity to stop the multimedia presentation and reflect on what they are learning and identify potential gaps in their knowledge. Thus, information processing in this situation frequently requires longer and more intense periods of cognitive and metacognitive activity. Regardless of the amount of information presented in each sensory channel, the learner's working memory (WM) will accept, process, and send to long-term memory (LTM) only a limited number of information units (Attneave, 1954; Jacobson, 1950, 1951). Thus, working memory requires pauses or direct prompting to accept, process, and send to the long-term storage only the most crucial information (Clark, Nguyen, & Sweller, 2006).

Another significant finding of this study is that students' self-efficacy perception was significantly improved after engaging in flipped teaching strategy compared to their self-efficacy perception after lecture-based. This benefit demonstrated by the statistically significant differences in the reported self-efficacy scores after the flipped activities compared to lecture-based, with the highest scores reported by students after the flipped activities and the least was in the lecture-based.

Finally, this study found that preservice teachers favor the use of flipped teaching strategy in a technology integration course compared to the lecture-based teaching strategy and this was demonstrated by the statistically significant differences in the number of students who were in favor of the flipped strategy compared to lecture-based, with the highest numbers for the flipped strategy and the least was for the lecture-based (452 vs. 104) or (62.90% vs.14.50%).

Although opinions tended to be positive, but there were invariably a few students who strongly disliked the change. One very interesting case was a student reported that she dislike the flipped teaching model because "Everyone asking questions. I wasn't able to concentrate and do my work in the classroom. I am a very ADD person. I have to be somewhere without distractions to do well". Although this student reported her dislike of the flipped teaching model, she received higher grades in all the quizzes completed after flipped classes compared to her quiz grade after the lecture-based class.