



COLLEGE OF EDUCATION & HUMAN DEVELOPMENT

LAMAR UNIVERSITY

MEMBER THE TEXAS STATE UNIVERSITY SYSTEM™

**PRE-SERVICE TEACHERS' ELEMENTARY
SCIENCE UNIT PLAN DEVELOPMENT &
SKILLS**

Mamta Singh, Ph.D.

3rd annual RGV STEM Education Conference

February 14th, 2020

McAllen, TX

RATIONALE

- The purpose of the study was to assess pre-service teachers' skills to incorporate collaborative learning, technology, and Gardner's Multiple Intelligence (GMI) in lesson plan for elementary science teaching
- The study further addressed incorporation of students' prior knowledge pertaining to lesson learning objectives
- Finally, the study assessed if the learning objectives were aligned with appropriate evaluative assessments

BACKGROUND

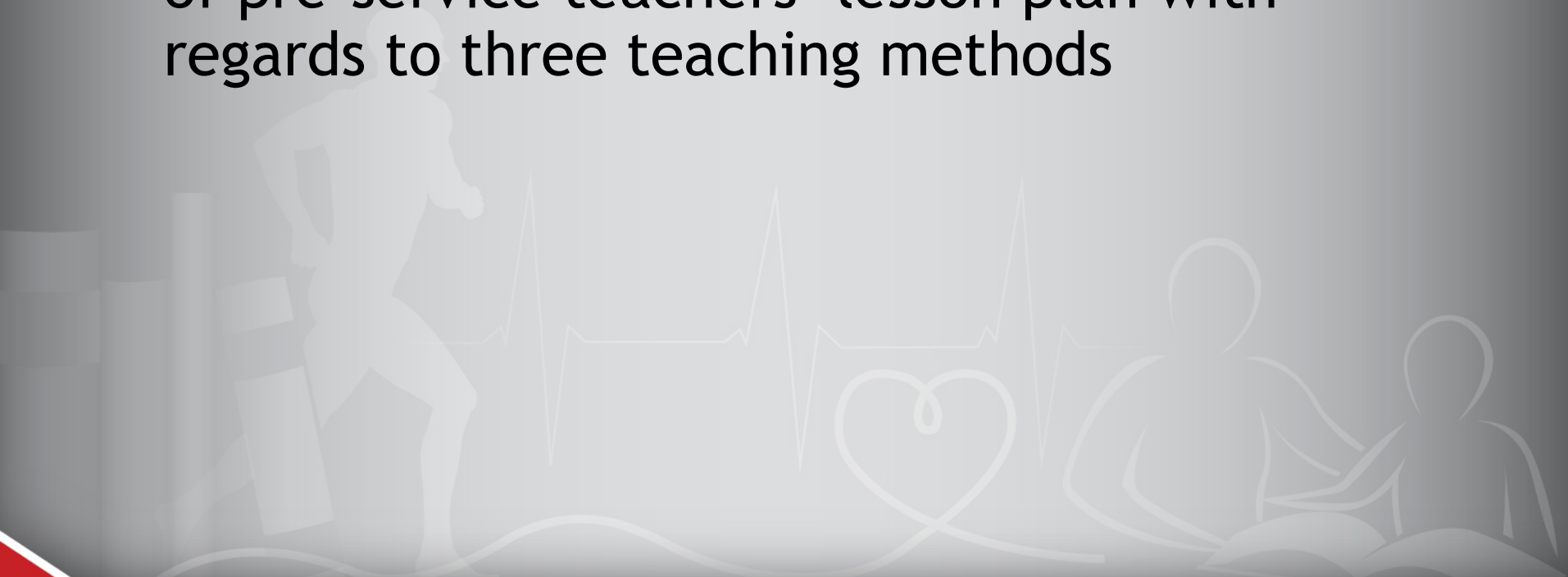
Pre-service teachers encounter a series of challenges in knowing, learning, understanding, and developing lesson/unit plans to effectively teach science (*Appleton, 2006; Darling-Hammond & Bransford, 2005; Davis, Petish, & Smithey, 2006; National Research Council [NRC], 2007*)

BACKGROUND

- The challenges become astronomical when pre-service teachers are in process of learning to incorporate different teaching methods and instructional design in their science lesson/unit plans to address diverse learners (Feiman-Nemser, 2001)

BACKGROUND

- More specifically, the aim of the study was to gain insight into the strengths and weakness of pre-service teachers' lesson plan with regards to three teaching methods



THEORETICAL FRAMEWORK

- “Learning is a social activity - it is something we do together, in interaction with each other, rather than an abstract concept,” (Dewey, 1938, p. 4)
- According to cognitive constructivist theory, the new learning is built upon the foundation of prior knowledge (Piaget, 1968)

THEORETICAL FRAMEWORK

- The new or modified knowledge and learning experience is heavily influenced by prior knowledge (Phillips, 1995)
- The present study is grounded on cognitive constructivist theory with an incorporation of three teaching methods & assessments

METHODS

- Twelve-unit plans with sixty lessons were collected for the study
- The pre-service teachers created the unit plans which consisted of a series of five lessons
- Following IRB compliance, the consent for this assessment was given to be reviewed and inclusion in the study

METHODS...

- The lesson plans incorporated following teaching methods:
 - Collaborative learning
 - Technology integration
 - Gardner's Multiple Intelligence (GMI)
 - A combination of two or three of these methods

STUDY SAMPLE

- The lesson plans within a unit were developed by pre-service teachers who were enrolled in science methods course of teacher education program at a large public university in southern United States
- These students were juniors or seniors. The unit plan development was a part of the class assignment

RESEARCH QUESTIONS

1. Did pre-service teacher consider students' prior knowledge in their lesson plan?
2. Were assessment/evaluation plan aligned with learning objectives?
3. Did pre-service teacher incorporate Gardner's Theory of Multiple Intelligences in lesson plan?
4. Did pre-service teacher incorporate technology in lesson plan?
5. Did pre-service teacher incorporate co-operate learning in lesson plan?

ASSESSMENT RUBRIC

Research Questions	1. Did pre-service teacher consider students' prior knowledge in their lesson plan	2. Were assessment/evaluation plan aligned with lesson objectives?	3. Did pre-service teacher incorporate Gardner's Theory of Multiple Intelligences in lesson plan?	4. Did pre-service teacher incorporate co-operative learning in lesson plan?	5. Did pre-service teacher incorporate technology in lesson plan?
Effective	Prior Knowledge and objective were completely aligned with each other/with proper sentence structure and correct grammar	Assessment/evaluation plan was aligned with lesson objectives/with proper sentence structure and correct grammar	Gardner's Multiple Intelligences was incorporated in lesson plan/ incorporated in lesson activity	Co-operate learning was incorporated in lesson plan/assessment	Incorporated technology for instructional activities and assessments plan effectively. Teacher planned to use at least two technologies platform. Just not only YouTube
Somewhat effective	Prior Knowledge and objective were partially aligned with each other/with proper sentence structure and correct grammar	Assessment/evaluation plan was partially aligned with lesson objectives/with proper sentence structure and correct grammar	Gardner's Multiple Intelligences was incorporated in lesson plan/partially incorporated in lesson activity	Co-operate learning was partially incorporated in lesson plan/assessment	Teacher somewhat incorporated technology for instructional activities and/or assessments plan. Teacher did not plan to use more than one technology. Teacher just planned to use YouTube
Not effective	Prior Knowledge and objective were not aligned with each other/without proper	Assessment/evaluation plan was not aligned with lesson objectives/without	Gardner's Multiple Intelligences was not incorporated in lesson plan/not incorporated	Co-operate learning was not incorporated in lesson plan/assessment	Teacher did not incorporate technology in lesson plan

RESULTS (TEACHING METHODS)

- 48% of the pre-service teachers were effective in incorporating co-operative learning in their lesson plans
- 28% of pre-service teachers were effective in incorporating technology in their lesson plans
- 30% of their lesson plans were effective in incorporating Gardner's Multiple Intelligence

RESULTS (PRIOR KNOWLEDGE)

- 67% of lesson plans were effective in addressing prior knowledge in their lesson plans
- 27% of lesson plans were somewhat effective in terms of considering students' prior knowledge for developing learning objectives
- 6% of lesson plans were not effective

RESULTS (ASSESSMENT ALIGNED WITH LEARNING OBJECTIVES)

- 43% of pre-service teachers were effective in developing lesson plans by incorporating assessment appropriately aligned with learning objectives
- 40% of pre-service teachers were somewhat effective
- 17% of pre-service teachers were not effective in incorporating assessment appropriately aligned with learning objectives

RESULTS...

- 50% pre-service teachers used YouTube or other video in their science lesson plan
- 30% pre-service teachers web resources
- 13% of them intended to use game or pop quiz as instructional or assessments activities
- 9% preservice teacher were eager to use Kahoot
- 4 % stated about Pinterest

CONCLUSIONS

- 28% of pre-service teachers were ***effective*** in incorporating technology in their lesson plans
- 30% of their lesson plans were ***effective*** in incorporating Gardner's Multiple Intelligence
- 48% of the pre-service teachers were ***effective*** in incorporating co-operative learning in their lesson plans
- 43% of pre-service teachers were ***effective in*** developing lesson plans by incorporating assessment appropriately aligned with learning objectives
- 67% of the lesson plans were ***effective*** in addressing prior knowledge in their lesson plans

FUTURE RESEARCH HYPOTHESIS

- 75% pre-service teacher will effectively consider students' prior knowledge for selecting objectives
- 75% of the lesson plans will be effective in addressing prior knowledge for selecting learning objectives
- 75% of pre-service teachers will effectively incorporate technology in their lesson plan

FUTURE RESEARCH HYPOTHESIS

- 75% of pre-service teachers will effectively incorporate co-operative learning in their lesson plans
- 75% of pre-service teachers will effectively incorporating Gardner's Multiple Intelligence in their lesson plans

IMPLICATIONS

- The challenges become astronomical when pre-service teachers are in process of learning to incorporate different teaching methods and instructional design in their science lesson/unit plans to address diverse learners (Feiman-Nemser, 2001)
- This study will be beneficial for pre-service to overcome such challenges!

SELECTED REFERENCES

- American Association for the Advancement of Science. (1993). Benchmarks for scientific literacy. New York: Oxford University Press.
- Appleton, K. (2002). Science activities that work: Perceptions of primary school teachers. *Research in Science Education*, 32, 393 - 410.
- Appleton, K. (Ed.). (2006). *Elementary Science Teacher Education: International perspectives on contemporary issues and practice*. Hillsdale, NJ: Erlbaum.
- Cochran-Smith, M., & Lytle, S. L. (1999). Relationships of knowledge and practice: Teacher learning in communities. *Review of Research in Education*, 24, 249-305.
- Crawford, B. A. (2000). Embracing the essence of inquiry: New roles for science teachers. *Journal of Research in Science Teaching*, 37(9), 916-937.
- Darling-Hammond, L. & Bransford, J. (Eds.). (2005). Preparing teachers for a changing world: What teachers should learn and be able to do. San Francisco: Jossey-Bass.
- Davis, E. A., & Smithey, J. (2009). Beginning teachers moving toward effective elementary science teaching. *Science Education*, 93, 745 - 770.
- Davis, E. A., Petish, D., & Smithey, J. (2006). Challenges new science teachers face. *Review of Educational Research*, 76(4), 607 - 651.

ACKNOWLEDGEMENTS

- MASON STEM Initiative
- Lamar University College of Education & Human Development

