Developing Teachers’ Intentions of Incorporating Socioscientific Issues in Lesson Design

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Conference, Problem, & Research Question

Conference Description:
This study was conducted as part of an Integrating STEM in Everyday Life conference series. The kickoff event for this conference series was held at a large public university located on the eastern coast of the United States. As part of this kickoff event, participants attended a one hour long workshop on incorporating the Socioscientific Issues (SSI) Framework described by Zeidler and Kahn (2014) and Sadler et al. (2019). During this workshop, facilitated by the second author, participants were introduced to Zeidler and Kahn’s SSI framework, and the ways in which it coincided with, and differed from, general STEM education. The workshop culminated with participants designing an SSI lesson in small groups based on a menu of topics presented.

Problem:
In an effort to address the complex nature of SSI instruction and learning, this case study examines the impact the SSI workshop, in the form of a STEM conference series, had on teachers’ intentions regarding SSI lesson planning. The case study design (Merriam & Tisdell, 2016) was chosen to provide “an in-depth description and analysis of a bounded system” (p. 39): the Integrating STEM in Everyday Life conference series kickoff event.

Research Question: In what ways, if any, do teachers’ thinking and intention of incorporating SSI in their lesson plans change after participating in the SSI workshop?

Methodology

Participants:
- All Teachers (In-Service and Pre-Service)
- OF those indicated grades (N=23),
- Majority (N=15) identified as teaching grades 9-12
- OF those indicating teaching grades (N=23),
- Majority (N=19) Pre-Service Teachers

Date:
For this study came from three sources:
- Pre-conference questionnaire (N=49)
- Consisted of two open-ended questions:
- Designed to determine if participants had ever before conducted an SSI-like lesson in the classroom and to activate their pre-conceptions of SSI-like lessons by asking them to describe an SSI-like lesson they had previously conducted or to describe such a lesson that they might like to conduct with their current or future students.
- Lesson plan analysis:
- Participants worked in groups (N=11) to develop a lesson using a chosen topic in an attempt to demonstrate components of the presented SSI framework in their designs.
- Photographs of participant lesson designs and plans were taken at the conclusion of the one-hour SSI introductory workshop
- Follow-up questions

Procedure:
- Consisted of 13 issues, 13 of which were closed ended and designed to capture participants’ attitudes and intentions surrounding SSI and sustainability, and their willingness to incorporate the concepts into future lessons.

Analysis:
- For pre and post-conference questionnaire responses were de-identified and entered into a spreadsheet:
- The responses were tabulated and expressed as a percentage.
- Open coding was used to generate a variety of codes for the open-ended responses in the pre-conference questionnaire.
- Open codes were then focused using axial coding to generate three themes that encapsulated types of lessons taught/planned.
- Lesson Plans were coded using the themes generated through axial coding, and again coded using components of the SSI Framework.

Findings

Teachers’ Intention to Incorporate SSI into Future Lessons

Characteristic | N | %
--- | --- | ---
Not used SSI previously | 14 | 34
New intention to use SSI | 11 | 27
Total intention to use SSI | 36 | 89

Elements of an SSI Lesson

- Issue Name
- Description of SSI Element
  - Identify the issue
  - Explore and explain the underlying scientific phenomenon
  - Engage in STEM modeling
  - Consider issue system dynamics
  - Employ reflective scientific skepticism
  - Contrast and compare multiple perspectives
  - Elucidate own position/solution

Summary and Next Steps

Summary:
- Lesson ideas did not vary greatly as topics were evenly split at 46% for Social, Cultural, and Political or Environmental. Only a small number of groups chose Technology and Engineering.
- More than half of the groups used four or more (64%) of the SSI elements. However, only 35% used Multiple Perspectives, an essential component of argumentation.
- Prior to the experience a third of teachers surveyed had never conducted an SSI lesson.
- At the conclusion of the sessions, nearly 80% of those teachers indicated an intention to develop SSI lessons with their students.
- This study suggests that the workshop had a positive impact on teachers, particularly those that had never taught using SSI previously.

Next Steps:
Intensive Workshop Series
- Recruit 30 participants for intensive workshop series
- Coaching to develop and teach SSI Lessons
- Evaluate lesson plans and student work samples
- Follow up interviews

Acknowledgments
This material is based upon work supported by the National Science Foundation under Grant No. 1852807.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

We also wish to thank the teachers who attended our conference and voluntarily participated in our study. Special thanks to our colleagues from the different universities (insert names here) for their contributions while planning and conducting workshops.