

**Examining Inquiry-Based Learning Stages of Concern for High School Agriscience
Teachers**

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Introduction/Need for Research

There is documented need for improvement of science comprehension amongst high school students in the United States (Desilver, 2017; OECD, 2016), and inquiry-based learning (IBL) is a recommended teaching strategy to improve science comprehension (Savery, 2006). Several researchers have focused on examination of learning outcomes for students (Gormally, Brickman, Hallar, & Armstrong, 2009; Luckie, Maleszewski, Loznak, & Krha, 2004), but few have researched the concerns of teachers who may wish to adopt IBL methodology. The objective of this study was to examine how participation in a professional development program (PDP) for inquiry-based learning methods affected the concern stage of teachers considering using IBL in their classrooms.

Conceptual or Theoretical Framework

The Concerns Based Adoption Model (CBAM) is a multi-dimensional conceptual framework for evaluating the process of change in education (George, Hall, & Stiegelbauer, 2013). The Stages of Concern Questionnaire (SOCQ) is one of the three CBAM dimensions, and is a quantitative instrument used to evaluate how teachers are feeling about a particular innovation they are adopting (George, Hall, & Stiegelbauer, 2013). The SOCQ has been used for over 30 years to help understand how teachers experience the adoption of new teaching strategies (Shotsberger & Crawford, 1999; Gabby, Avargil, Herscovitz & Dori, 2017). More specifically, it has a history of being used to assess the stages of concerns of agricultural educators adopting IBL (Shoulders & Myers, 2011).

According to George, Hall, & Stiegelbauer (2013), concerns experienced by teachers who adopt educational innovations tend to fall into seven general categories: (0) unconcerned, (1) informational, (2) personal, (3) management, (4) consequence, (5) collaboration, and (6) refocusing. Concerns for an individual teacher also tend to follow a logical progression as the teacher gains more experience and confidence with using an innovation. This study used the SOCQ questionnaire from the CBAM conceptual framework to evaluate how the concern stage changed for high school agriscience teachers after completing a year-long PDP on IBL.

Methodology

Twenty-seven high school agriculture and science teachers from a Midwest state participated in a year-long PDP. Prior to start of the initial 2-day face-to-face session, participants completed the SOCQ to gauge how they felt about IBL. Then, participants discussed IBL and how people learn. Participants were also provided basic knowledge content on four science subjects including genetics, muscle biology, microbiology, and nutrition. Teachers were given the opportunity to experience IBL teaching strategies, from the vantage point of their students, as they worked through a pre-developed IBL activity associated with each of the four science subjects. During the subsequent school year, teachers incorporated these IBL activities into their high-school curriculum and participated in Zoom web meetings to discuss progress and address questions concerning IBL. All materials and background information needed to conduct the four IBL activities were provided. Finally, each teacher participant was asked to develop and incorporate their own IBL activity and share with fellow teacher participants during a follow-up, face-to-face session. Following completion of PDP activities, participants again completed the SOCQ to gauge how they felt about IBL. Of the 27 original participants, only 10 completed the entire PDP, including the pre- and post- SOCQs.

Results/Findings

SOCQ results were evaluated for the group, and then for individuals. When evaluated as a group, participants generally placed a low priority on IBL. The before profile also indicated that the group was generally open to IBL. After the PDP, the profile still indicated the group generally placed a low priority on IBL, but showed conflicting signs of both openness and resistance to IBL. The profile change indicated that as a group, participants did not progress positively in their stage of concern and may have added some resistance to using IBL as a teaching strategy as a result of participating in the PDP.

Evaluation of individual results indicated that while some participants showed a positive progression, most PDP participants did not progress in their concern stage, and some developed increased resistance to IBL as a teaching strategy. The PDP had a positive impact on 30% of the participants, where their concerns stage progressed by one stage after participating in the PDP. However, 70% of the participants remained at stage zero, and three of those seven showed increased resistance to adopting IBL in their SOCQ profiles after completing the PDP.

Conclusions

High school agriscience teachers adopting IBL initially appeared to be open to the new teaching strategy as evidenced both by their willingness to participate in a year-long PDP and their pre-PDP responses to the SOCQ. However, after participating in the PDP, results were mixed with the majority of participants not showing positive progression in their stages of concern, and some showing increased resistance to IBL. This suggests teachers may need more robust and tailored support when adopting IBL for their classrooms.

Implications/Recommendations/Impact on Profession

Careful consideration should be given to PDP design to ensure teachers have access to adequate and tailored support as they implement IBL into their teaching practices. One-size-fits-all professional development may not be a preferred approach because teachers vary in their investment in teaching strategies based on their level of experience (Shoulders and Myers, 2011), concerns about their own adequacy based on their familiarity with specific subjects (Fritz and Miller, 2003), and fears about how IBL will affect student outcomes (Aydeniz and Southerland, 2012). Development of robust PDPs should consider how these and other factors may play a role in helping individual teachers become comfortable with IBL as a teaching strategy.

References

- Aydeniz, M., & Southerland, S. A. (2012). A national survey of middle and high school science teachers' responses to standardized testing: Is science being devalued in schools? *Journal of Science Teacher Education*, 23(3), 233-257. doi:10.1007/s10972-012-9266-3
- Desilver, D. (2017, February 15). U.S. academic achievement lags that of many other countries. Retrieved from <http://www.pewresearch.org/fact-tank/2017/02/15/u-s-students-internationally-math-science/>
- Fritz, C. A., & Miller, G. S. (2003). Concerns expressed by student teachers in agriculture. *Journal of Agricultural Education*, 44(3), 47-53. doi:10.5032/jae.2003.03047
- Gabby, S., Avargil, S., Herscovitz, O., & Dori, Y. J. (2017). The case of middle and high school chemistry teachers implementing technology: using the concerns-based adoption model to assess change processes. *Chemistry Education Research and Practice*, 18(1), 214-232.
- George, A., Hall, G., & Stiegelbauer, S. (2013). *Measuring implementation in schools: The stages of concern questionnaire*. Retrieved from Southwest Educational Development Laboratory website: http://www.sedl.org/cbam/SOCQ_manual_201410.pdf
- Gormally, C., Brickman, P., Hallar, B., & Armstrong, N. (2009). Effects of inquiry-based learning on students' science literacy skills and confidence. *International Journal for the Scholarship of Teaching and Learning*, 3(2). doi:10.20429/ijstol.2009.030216.
- Luckie, D. B., Maleszewski, J. J., Loznak, S. D., & Krha, M. (2004). Infusion of collaborative inquiry throughout a biology curriculum increases student learning: a four-year study of "teams and streams". *Advances in Physiology Education*, 28(4), 199-209.
- Organisation for Economic Co-operation and Development (OECD). (2016). *Country notes: Key findings from PISA 2015 for the United States*. Retrieved from <http://www.oecd.org/pisa/PISA-2015-United-States.pdf>
- Savery, J. R. (2006). Overview of problem-based learning: definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1). doi:10.7771/1541-5015.1002
- Shotsberger, P. G., & Crawford, A. R. (1999). On the elusive nature of measuring teacher change: An examination of the stages of concern questionnaire. *Evaluation & Research in Education*, 13(1), 3-17. doi:10.1080/09500799908666942
- Shoulders, C., & Myers, B. (2011). An analysis of national agriscience teacher ambassadors' stages of concern regarding inquiry-based instruction. *Journal of Agricultural Education*, 52(2), 58-70. doi:10.5032/jae.2011.02058