

Exploring Teachers' Intent to Use Inquiry-Based Learning in the Classroom After a Prolonged Professional Development

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Introduction

In 2019, 41% of 12th grade students in the United States were not proficient in science (National Center for Education Statistics, 2019). Inquiry-based learning (IBL) can be used as a strategy for teaching science because it allows students to develop their knowledge, understanding, and interest in science (Calalb, 2018). "Inquiry-based teaching is a teaching method that can be used to combine the curiosity of students and the scientific method to enhance the development of critical thinking skills while learning science (Warner & Myers, 2011, p.1). Although IBL has great benefits, teachers believe they are not well prepared to teach and facilitate IBL lessons (DiBiase & McDonald, 2015). Researchers have also found that efficient professional development (PD) is needed to alter teachers' attitude toward the IBL teaching approach and increase teachers' confidence using IBL (Guskey, 2002; Kreifels et al., 2021). Therefore, the purpose of this study was to explore teachers' intent to integrate IBL animal science concepts into science and agriscience curriculum after completing an IBL PD.

Theoretical Framework

The theory of planned behavior (TPB) provided the theoretical framework for this study to better understand motivating factors of teachers' intent in utilizing IBL animal science concepts after participating in a professional development (Ajzen, 1991). According to TPB, attitude, subjective norms, and perceived behavioral control are predictive of behavioral intent (Ajzen, 1991; 2012). Attitude refers to having a favorable or unfavorable perception of a behavior (Ajzen, 1991). Additionally, subjective norms are social pressure and norms that influence behavioral performance, and perceived behavioral control is one's perception of their own ability to perform and control a behavior (Ajzen, 1991). Factors related to TPB elements including supportive administration, class sizes, state curriculum pressure, and limited access to resources act as barriers to teachers' intent of using IBL (DiBiase & McDonald, 2015). The PD was assumed to have positively addressed the TPB variables, so this portion of the project has focused on teachers' intent to integrate IBL animal science concepts into curricula since intent is predictive of actual behavior (Ajzen, 1991).

Methodology

A total of 30 agriscience and science teachers from [TN] and [NE] participated in a year-long PD program that began in the summer of 2022. The teachers completed three, online modules related to using IBL before participating in a 5-day in-person PD program. During the PD, the teachers gained experience from both the student and teacher perspective with the following six IBL animal science concepts: animal health, breeding and genetics, management, meat science, nutrition, and reproductive physiology. Each animal science concept related to a basic scientific concept to allow for collaboration between science and agriscience teachers. Following Desimone's (2009) principles, participants were also given the resources needed to implement the IBL animal science concepts in the classroom to enable them to facilitate the activities throughout the school year. Using qualitative methodology, data were collected through focus groups. Participants were broken into two focus groups per state (four focus groups in total) after

the in-person PD program was concluded to discuss their experience. Using a semi-structured moderator's guide, the participants were asked questions related to their confidence, motivation, and intent to integrate IBL animal science concepts. Each focus group consisted of six to nine participants, lasted 60 minutes, and were recorded and transcribed for accuracy. The transcriptions were analyzed using *a priori* coding to identify participants' intent to use IBL in the future (Ajzen, 1991). The researcher used multiple validation strategies that included an audit trail and peer debriefing (Creswell & Poth, 2018).

Findings

Many participants expressed their intent to use the IBL animal science concepts after the PD. Participant 9 (TN) said, "I've actually planned to use a lot these activities in [my ecology] class where I might not have the time to put them into my biology [class], which is state tested." When participants were asked if they would continue using agriculture as a context for teaching science, Participant 7 (NE) said, "Yes. I feel [agricultural concepts] make learning more real." Additionally, Participant 16 (NE) explained, "I like to be intentional with my time...When I think about spending time to form those [science and agriculture] cross curriculum bonds, this is something I see as intentional." Although many participants had immediate intentions to integrate IBL animal science concepts into their curriculum, others stated they became more aware of it. Participant 13 (TN) shared "If not motivated [to use animal science concepts], the right word might be just more aware and inspired to incorporate into my own anatomy and physiology teaching." Later, Participant 13 (TN) added, "I might be much more aware of [linking] everything towards animal science [context]...Maybe that'll be a hook [for students]."

Conclusions, Implications & Recommendations

Concluding the PD, participants intended to integrate the IBL animal science concepts that they learned into their curriculum. They also had a better understanding of the need for IBL and how to connect science and agriculture. After the PD, the participants expressed positive attitudes toward the PD and explained that they now feel prepared to teach IBL lessons; however, their intent was less when perceived barriers, like state standards, were present. Furthermore, the participants concluded that they have a better understanding of IBL, and that they intend to integrate the IBL animal science concepts into their curriculum. Overall, participating in an IBL PD positively impacted teachers' intent to use IBL in the classroom, which will likely lead to actual implementation of IBL when teaching animal science concepts in the future (Ajzen, 1991).

When creating future PD programs, it would be beneficial to ensure that teachers are given the opportunity to collaborate with other teachers. Collaboration between science and agriscience teachers allows each teacher to gain a different perspective and positively impact the planning and facilitation of lessons. Furthermore, as students' science proficiency remains low, high school administrations should encourage their teachers to pursue at least one IBL PD. There could also be value in replicating a similar IBL PD that focuses on other agricultural areas such as plant science, agricultural mechanics, or agribusiness. To further explore the impacts that an IBL PD program has on agricultural and science teachers' intent to use IBL nationwide, this study should be conducted at other universities and states.

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