Review of the Literature

Inquiry-Based Learning and the Development of Higher-Order Thinking Skills

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Inquiry-Based Learning

A math teacher walks into their classroom with what they feel as one of the best prepared lessons. The students come in and reluctantly take their notes out to begin the day's lesson. The teacher delivers the material while the students take notes and by the end of class, the students are working on problems independently and on occasion asking the teacher for help. When the bell rings, the teacher dismisses the students and the teacher thinks to themselves that the lesson went great! This cycle keeps up for several days and it is time for test day. As the teacher is grading their test, the teacher cannot understand why the grades are so bad. It does not seem that the students maintained anything that had been taught over the past several days. The teacher cannot help but to think, what went wrong?

Many educators have asked themselves this question time and time again. The problem is that today's students are learning in a completely different way. Inquiry-based learning (IBL) is one of the latest trends in education. IBL has been more widely used in the European nations and is slowly starting to make an appearance here in the United States. Inquiry-based learning is defined as where students are engaged in essentially open-ended, student centered, hands-on activities based on real life problems (Rooney, C., 2012). IBL helps with the engagement of students, by allowing them to collaborate with their peers. The teacher is moving from being the teacher to being the facilitator and the students are becoming the teachers.

The literature review will examine how inquiry-based learning could possibly help with developing higher-order thinking skills through engagement and motivation.

Engagement

The Glossary of Education Reform (2016) defines student engagement as the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or

being taught. When teachers are being evaluated in Texas, there is a domain that involves student engagement. For teachers to score high in this domain, the teacher must try to move the students to more towards mainly student-centered learning than teacher-centered learning. Kourti (2019) explains that there are three levels of engagement; cognitive-where the student is willing to go above doing the minimal amount of work, sees the importance of learning, and shows a willingness to learn. The second level of engagement is behavioral, which is the idea of the student taking an active role in the learning, and the third level of engagement is affective were the student feels a sense of belonging and starts taking control of his or her learning. Kourti (2019) also explains that it is important to understand that these three do not work independently of one another, that instead they work together.

It is a hard task to get students engaged in math classes. Without engagement in the classroom, students cannot be expected to think through problems or reason through problems on their own (Rooney, 2012). When students are engaged in their learning they are able to take a dive into a much richer and deeper way of thinking. Kourti's (2019) study showed that not only did engagement increase by using IBL, but also IBL had a positive impact on student behavior. IBL gave the student authenticity of their work and it allowed the students to see the usefulness of math in everyday life.

Motivation

Kourti (2019) defines motivation as people's energy and boost for learning. Motivating students is one of the hardest task faced by teachers today. Math is the one subject that can send students into a nose dive and make them feel stupid and unmotivated to work (Camenzuli, J. and Buhagiar, M., 2013). The quality of the lesson and the teaching style have a huge impact on motivating students. Rooney (2012) found that it takes a lot of time and effort on the teacher's

part to develop high quality lessons and it is the teacher's responsibility to monitor this learning process.

Inquiry-based learning opens the door to help students get motivated about their learning by showing them the relevance of the math. Too many times students ask the question, "When am I ever going to use this?" in their math classes. In Ronney's (2012) study it showed that an IBL classroom helped students appreciate math and the students were able to reach a deeper level of thinking because the students were engaged and motivated in their learnings. The students found that the problems that they were working had real meaning to them and that they were able to make the connection of their learning to everyday life. In Camenzuli and Buhagiar's (2013) study, they found students enjoying themselves in the learning process which was a big component in helping students get motivated. One must note that in Kourti's (2019) study, it showed that IBL was not successful in motivating all students, but it did help motivate the majority.

Conclusion

Overall the literature showed that inquiry-based learning can help to develop higher-order thinking skills in a math classroom by allowing the students to get motivated and engaged in the learning that is taking place. However, in all the studies this practice is not something that you can just leap into and expect great results. It takes great planning on the teacher's part and the willingness to constantly reflect on what is working and what is not. Over time, the researchers and the students got comfortable where IBL could take shape.

Also during the review of the literature, it was noted that the majority of IBL studies were done in gifted-talented classrooms (Oppong-Nuako, J., Shore, B., Saunders-Stewart, K., and Gyles, P., 2015). This does not imply that gifted and talented students are the only ones capable

of working in an IBL classroom, there just has not been enough studies in other classrooms. An additional question would be, “Can an IBL classroom be beneficial to non-gifted and talented students in developing higher-order thinking skills?”

References

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