Inquiry-Based Learning in the Classroom

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1. Introduction

Countless teachers at all grade levels are currently trying to draw away from traditional teaching techniques such as lectures and note taking and instead trying to incorporate more engaging thought-provoking lessons into their curriculum (Barron & Darling-Hammond, 2008). Inquiry-based learning goes back to John Dewey and is inspired by the constructivist belief that there are many ways to construct meaning with the building blocks of knowledge and acquiring the skills of learning is more important than learning specific information (Youth Learn, 2016). Inquiry-based learning intellectually challenges students "to construct and organize knowledge, consider alternatives, engage in detailed research, inquiry, writing, and analysis, and to communicate effectively to audiences" (Newmann, 1996, as cited in Barron & Darling-Hammond, 2008, para. 6). Inquiry-based learning positively reinforces skills in the physical, emotional, and cognitive domains (Youth Learn, 2016), it sparks curiosity and creativity more than traditional schooling (Spencer, 2021), it recognizes personal discovery by the learners and teaches learners to respect one's own interests, as well as the interests of others (Ismail & Elias, 2006).

2. Merits of Inquiry-Based Learning

Employers are currently placing more emphasis on twenty-first century skills such as communicating, collaborating, critical thinking, researching ideas, collecting, synthesizing, and analyzing information (Care, et.al., 2017). Hence, education today must also evolve and adapt to the advancements in technologies, information, job requirements, and social conditions in order to be productive. Methods such as rote learning and pure memorization are no longer sufficient. Inquiry-based learning helps develop critical thinkers who can collaborate and cooperate through effective oral and written communication (Barron & Darling-Hammond, 2008). Inquiry potentially sparks curiosity which prepares the brain for learning and increases activity in the hippocampus, the region of the brain connected to memory (Guido, 2017; Schunk, 2012). When students answer questions with their own thought processes, as opposed to being spoon fed the answers in lectures, they take ownership of their own learning and reach deeper understanding through high-order thinking. This process can make learning more rewarding and instills lifelong learning habits. Students begin self-guided inquiry and take the initiative to search for the answers to their own questions. The various instructional strategies of inquiry-based learning can appeal to diverse learning styles, as well as diverse age groups, giving it flexibility to work in almost any classroom (Guido, 2017; Youth Learn, 2016).

3. Types of Inquiry-Based Learning

According to Guido (2017), there are four basic types of inquiry-based learning: confirmation, structured, guided, and open. In confirmation inquiry, the instructor presents the students with all the information: the question, the answer, and the method in which the answer was obtained. The students must then ponder and investigate how the specific method was applied to obtain the answer. In structured inquiry, students are given an open question and an investigation method but not the answer. Using the given method, students explore the answer and present evidence for their conclusion. Students are offered only an open question in guided inquiry. Typically working in groups, they must decide for themselves how to investigate and analyze to reach a conclusion. Finally, in open inquiry, the students do everything themselves, including posing their own original question. The instructor acts more as a facilitator guiding and giving advice only when necessary. After the students have gathered, organized, and analyzed their information, they present their results for further discussion and expansion.

3.1 Narrative Inquiry

Narrative inquiry can be a useful tool in teacher education to introduce inquiry learning, especially for those who have only experienced traditional schooling. Chan (2012) asserts that in an examination driven education system like Hong Kong, schools naturally place heavy emphasis on examination achievement. Even parents tend to value academic achievement over other areas of development and start pressuring their children from primary school to do well on examinations, for their future upward social mobility may depend on it. This mindset contributes to passive learning methods such as rote learning and memorization of information. At the same time, this mindset instills resistance to critical thinking and creative activities. Hence, as a teacher educator, Chan (2012) found pre-service teachers to be passive and unable or unwilling to answer questions in class. To help pre-service teachers become more open and comfortable with inquiry learning, she introduced narrative inquiry into her classes. With the narrative learning method, students write their personal stories to share with others or to review themselves. Butcher (2006) asserts "narrative as having meaning and its connections, linking human actions and events into multi-related events, displaying the significance that events have on one another" (p.198). By recounting their own experiences through narrative or stories, asking each other or themselves questions regarding the narratives, and reflecting on their existing knowledge, pre-service teachers could make connections between their past and present experiences in order to reconstruct their curriculum for upcoming years. This personal form of inquiry can help create a safe learning environment and encourage self-directed development and advancement.

3.2 Project-Based Learning

Project-based learning is a guided inquiry which is centered around driving questions that lead students to discover central concepts or principles and is focused on a constructive investigation that encompasses inquiry and knowledge building (Barron & Darling-Hammond, 2008). Not only are students engaged in factual learning, but they also transfer their learning to other situations and problems. Students who participated in the project-based curriculum increased their ability to define problems and were able to support their reasoning with clear arguments. Their motivation increased, their attitude toward learning became more favorable, better work habits emerged, critical

thinking skills blossomed, and problem-solving abilities flourished.

Project-based learning approaches are especially suitable for language classes since the language used in the projects can be catered to the students' language abilities. Even classes with mixed language abilities can work together. Group members can help each other learn the vocabulary for the topic, explain the information they found when necessary, and show each other how and where they found answers to their questions. This can foster peer support which potentially results in greater self-confidence and increased risk-taking (La Porte, 2016). Each student can take on a role in the project that they feel most comfortable. In addition, students learn how to cooperate and collaborate with their classmates which will be an essential skill after they enter the working world.

3.3 Problem-Based Learning

Similar to project-based learning, in problem-based learning, students usually work in collaborative groups but instead of addressing driving questions, they analyze a meaningful real-world problem and identify what they need to learn in order to solve the problem. As students explore and gain a deeper understanding of the problem, they formulate hypotheses about possible solutions (Hmelo-Silver, 2004; Barron & Darling-Hammond, 2008). A principal part of the process is identifying knowledge deficiencies, otherwise known as learning issues, that students research during their self-directed learning. As with project-based learning, the teacher acts a facilitator, guiding the process of applying cognitive skills needed for problem solving, encouraging participation to build collaboration skills, and asking questions to solicit reflection on the knowledge they gained and the effectiveness of the strategies they utilized. Problem-based learning is an instructional approach in which students potentially develop flexible understanding and lifelong learning skills (Hmelo-Silver, 2004).

3.4 Prediction, Observation, Explanation Cycle

The prediction, observation, explanation cycle (POE) promotes constructivism by linking prior knowledge to new knowledge (Krajcik, et.al., 2000). In a science classroom, "Students are asked to draw on their prior knowledge to make predictions about what will occur during a demonstration, what they might find when searching for information, or what the results of an experiment might be. They can make individual predictions, share them with a group, discuss the reasons for their predictions and come to some consensus about what might occur as they exchange ideas" (p.6). With a little tweaking, the same process can be applied in a language classroom. Students read part of a story, make predictions of how the story would proceed or conclude, "observe" or listen to other students' predictions, explain the reason for their prediction, and then make compare-and-contrast presentations of their predictions and the actual story. In addition to language practice, this instructional technique can also be used as a cultural comparison lesson. Depending on the situation in the story, people of different cultures or different socioeconomic backgrounds may make completely different predictions that reflect their culture or background.

One reason to use POE in a language classroom is that perhaps POE can motivate students to view the reading as more than just a school required assignment. With POE they can use their creative imagination to make their classmates laugh or share a personal experience with the class. Another motivating factor is the actual sharing of predictions. Students may spend extra time on their predictions to impress the other students, especially the competitive students. On the flip side,

if only one student does not have a prediction to share, that student may feel embarrassed. In addition, with POE, sharing their predictions, reading the ending of the actual story, and then comparing the predictions with the actual story would take considerable time, albeit it would be much more fun than a comprehension quiz.

3.5 Flipped Classroom

In order to utilize class time more efficiently, flipped classroom is an excellent technique. The flipped classroom "is based on the idea that class time will be spent with students engaged in active learning" (Brame, n.d., p.5). Rather than imparting knowledge through lectures and reading passages in class and then having students apply that knowledge to homework, the students read material or watch videos at home before class so that during class, students can engage in active learning (Herreid & Schiller, 2013); thus, traditional classroom work and homework assignments are flipped. In other words, "The flipped classroom switches the in-class time and out-of-class time to enable more interactions between teachers and students in the class" (Lai & Hwang, 2016, as cited in Zheng, Bhagat, Zhen & Zhang, 2020, p.1). However, simply doing traditional homework, such as worksheets, during class is not enough. Zheng et.al. (2020) emphasize that integrating other pedagogical models, such as active learning, into the flipped classroom maximizes effectiveness. Herreid and Schiller (2013) suggest that the teacher can use classroom time more effectively and creatively to customize the curriculum to the students' abilities. In doing activities during class, teachers can observe students more closely making formative assessments of each students' strengths, weaknesses, and learning styles. In addition, assigning reading for homework is especially useful if the students' reading abilities vastly vary. The students can take their time at home to read at their own pace without pressure, looking up words when necessary. Hence, there are a plethora of benefits for the flipped classroom.

3.6 Know, Wonder, Learned

Another commendable inquiry technique is the Know, Wonder/Want to know, Learned (KWL) chart. Students write their background knowledge on the subject in the "what I know" column. Then they generate questions on the subject and write them in the "what I wonder/what I want to know" column. During or after the reading, students write new knowledge and information gained in the "what I learned" column (Chauvin & Theodore, 2015). KWL aligns well with the constructivist philosophy. Teachers can explicitly see how students are assimilating or accommodating "what they knew" with "what they learned." It is also an easy concise way for teachers to make formative assessments and for learners of all levels to record their progress. Youth Learn (2016) offers a technique similar to the KWL chart; however, theirs is more specific. Their preliminary questions and information are divided into four categories: what I want to know, what I already know, what I think I know but am not sure, and what I don't know. Adding the final "what I learned" category would give the students a greater sense of accomplishment and, as with the KWL chart, explicitly show how their new knowledge assimilated with or accommodated their old knowledge.

One challenge with the KWL chart is the quality of the questions in "W" part of the process. In this section, they write questions on the topic; however, sometimes those questions are too basic or impractical. To address this issue, Quigley et al. (2011) suggest that assessing a level to the questions based on the quality may be appropriate. However, the quality of questions is often

difficult to measure. As an alternative, Youth Learn (2016) suggests adding conditions to the questions in the chart. "The questions must be answerable…The answer cannot be a simple fact…The answer can't be already known…The questions must have some objective basis for an answer…The questions cannot be too personal" (p.3). The instructor can also help the learners refine their questions by identifying more specific questions that can be linked to broader questions.

In addition to quality questions, identifying relevant resources is another issue. Students may gather an abundance of information but then they must scrutinize the credibility of the sources of information, especially with information found on the internet. Developing critical evaluation skills, media literacy, and information literacy is key to determining if the source is biased by the perspective.

3.7 Wonder Day/Week

Along the same lines as the KWL chart, Spencer (2021) proposes a Wonder Day/Week project in which students complete the sentence "I wonder why/what would/how/if…" They then ask questions, research information, analyze the answers, and share their findings. After the students research the topic, they write or present what they learned, where they learned it, how good the information is, and new questions that arose from their research.

This method may prove to be an effective way to get students in touch with their own interests and decide on a research topic. Oftentimes, their topics are too broad or too shallow to merit a caliber research paper. Students can narrow down their topics for research based on the quantity and quality of their questions. Their questions can also serve as a self-guide for a more intense deeper dive into their topic. In addition, they can make formative and summative self-assessments of their papers by analyzing how well they answered their own questions in their paper. Of course, the teacher will always be there to facilitate and guide when necessary; however, in every step of the process, students will be primarily self-reliant giving them a greater sense of accomplishment in the final stage of presenting their findings.

4. Conclusion

In conclusion, constructivist inquiry-based learning is a highly recommended way to motivate students to get more involved in their own learning, develop their critical thinking skills, improve their communication skills, and instill lifelong learning habits. Our ever changing, increasingly complex workforce and society demands greater proficiency in higher-order thinking and 21st century skills. Educational institutions should align with those demands and make appropriate changes to the curriculum by including inquiry-based learning.

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