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Inquiry Learning in Higher Education

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Abstract

Acknowledgment of Inquiry Learning, sometimes known as Open Learning, Guided Investigation, or Learning Discovery, began in the early 1960s. Since its initial use in science labs, inquiry learning can be found in use across several professional arenas, including education, business, and civic learning.

It is useful to understand the origins and benefits of inquiry learning, examine its use in higher education classrooms, and describe basic fundamentals in how to run, moderate, or facilitate an inquiry learning experience. Additionally, action learning, the emerging learning approach in the workplace which uses many of the same learning elements as inquiry learning, demonstrates how these innovative learning approaches better prepare students for the skills necessary in today's workplace.

Introduction

Inquiry learning is an effective instructional tool which, when skillfully designed and applied, can be a dynamic learning tool to enhance the learning experience. Inquiry learning accomplishes this through increasing engagement and allowing the learner to explore and increase self-autonomy and self-mastery of skills desired.

The *National Science Education Standards* (National Committee on Science Education Standards and Assessment, 1996) defines scientific inquiry as “the diverse ways in which scientists study the natural world and propose explanations based on the evidence derived from their work. Scientific inquiry also refers to the activities through which students develop knowledge and understanding of scientific ideas as well as an understanding of how scientists study the natural world” (p.23).

Scientific inquiry reflects how scientists come to understand the natural world and it is at the heart of how many students learn. From a very early age, children interact with their environment, ask questions, and seek ways to answer those questions. The understanding of content and methods is significantly enhanced when ideas are anchored to inquiry experiences. Although this definition is centric to science, it really can be applied across all schools of thought and learning methods.

Despite the demonstrated effectiveness of inquiry learning, it is still commonplace to find the traditional “stand and deliver” approach in most universities though inquiry learning strategies are more effective than traditional approaches. Inquiry learning better prepares students for their own professional learning experiences once they get into the workplace.

The Rise of Inquiry Learning

Inquiry learning had its roots in science labs prior to its emergence in science education classrooms during the 1970s. The development of such tools as Marshall Herron’s scale for evaluating the amount of inquiry in science lab experiences allowed for science students to engage with and explore science concepts in

more meaningful ways (Herron, 1971). Also around this time, similar strategies which encouraged quality questioning, constructivist ideas, and student exploration emerged in many science museums.

One of the most well-known examples of these museums was the Exploratorium in the San Francisco Bay area (Oppenheimer, 1972). The Exploratorium was developed in 1969 by Frank Oppenheimer, a well-known scientist who observed the impact that hands-on learning had with his own high school students. Like many other science museums that followed, inquiry learning allowed for student exploration or informal learning to be at the center of exhibits. These experiences provided further validation of constructivist theories and the important role they played in shaping one’s own thought process to better understand the world and the connectedness within it.

Hands-on learning, or the idea of allowing students greater autonomy in their use of the scientific method, also emerged during this period. With hands-on learning arriving in the classroom, the teacher could now explore its impact throughout the entire school curriculum. The National Science Teachers Association (NSTA) has created the most extensive evidence of inquiry learning’s impact on the classroom learner and further provided the framework for implementing inquiry learning effectively.

As noted from the NSTA website (NSTA Board of Directors, 2004), numerous declarations must be in place to support inquiry learning as a successful learning approach. These declarations are as follows:

- Planning an inquiry-based program by developing both short- and long-term goals that incorporate appropriate content knowledge.
- Implementing approaches to teaching that cause students to question and explore and to use those experiences to raise and answer questions about the natural world. The learning-cycle approach is one of many effective strategies for bringing explorations and questions into the classroom.

- Guiding and facilitating learning using inquiry by selecting teaching strategies that nurture and assess students' developing understandings and abilities.
- Designing and managing learning environments that provide students with the time, space, and resources needed for learning science through inquiry.
- Receiving adequate administrative support for the pursuit of science as inquiry in the classroom. Support can take the form of professional development on how to teach scientific inquiry, content, and the nature of science; the allocation of time to do scientific inquiry effectively; and the availability of necessary materials and equipment.
- Experiencing science as inquiry as a part of students' preparation program. Preparation should include learning how to develop questioning strategies, writing plans that promote abilities and understanding of scientific inquiry, and analyzing instructional materials to determine whether they promote scientific inquiry.

NSTA's declarations on inquiry learning support the effectiveness of inquiry learning in both the higher education learning environment and in the workplace. These elements are also found in City University of Seattle's (2011) Academic Model as well as those of other institutions which emphasize practical learning applications for students. The elements of such a model are as follows:

A Focus on Student Learning—When students participate in well-designed inquiry learning, student learning should increase.

Reflective Practitioner Faculty—Inquiry learning allows one to step back from the traditional direct instruction process, observe student learning, and offer coaching to those who might need further tools to reach learning outcomes. In the coaching process, the ability to teach new skills or reinforce old ones rises to the top, allowing the instructor to provide important one-on-one assistance as needed.

Relevance to the Workplace—Inquiry learning, when structured around real-life experiences, ends up becoming a

more realistic experience in replicating workplace environments and therefore is more relevant to lifelong learning.

Service to Students and Responsiveness—Students will become more autonomous learners when inquiry learning is introduced because they will have a greater stake in the learning process. Essentially inquiry learning allows the learners to take control of their learning experiences with a greater sense of self-motivation and mastery.

The rise of inquiry learning in schools also saw a parallel emergence in the business workplace. According to observations of action learning at Cisco (Lamoureux, 2009), action learning in the workplace is a way of simultaneously conducting action and inquiry as a disciplined leadership practice that increases the wider effectiveness of actions. Such action helps individuals, teams, organizations, and institutions become more capable of self-transformation and thus more creative, more aware, more just, and more sustainable.

The Connection to Action Inquiry in the Workplace

As Bill Tolbert (2004) points out in his book *The Promise and the Power of Action Inquiry: The Secret of Timely and Transforming Leadership*, "In principle, no matter how much or little positional power you have, anyone in any family or organization can become more effectively and transformationally powerful by practicing action inquiry" (p. 1).

Tolbert (2004) continues to note, "Action inquiry is a lifelong process of transformational learning that individuals, teams, and whole organizations can undertake if they wish to become:

- Increasingly capable of making future visions come true
- Increasingly alert to the dangers and opportunities of the present moment
- Increasingly capable of performing in effective and transformational ways" (p.1).

The increase of action inquiry learning in organizations gives rise to a number of improved learning opportunities during an employee's career. Examples of these learning experiences include workplace simulations and new approaches to e-learning as noted in Clark Aldrich's (2004) book *Simulations and the Future of Learning: An Innovative (and Perhaps Revolutionary) Approach to e-Learning*. Such examples are also found throughout City University's courses.

To clarify the pedagogical shift associated with inquiry, it is useful to see how the three Rs of the past have become the seven Cs of the present. The three Rs, reading, writing, and arithmetic, have been referred to as the old framework of learning. Meanwhile, the 21st Century Skills Project has given rise to the new seven Cs of learning, which include critical thinking and problem solving; creativity and innovation; collaboration, teamwork, and leadership; cross-cultural understanding; communications, information, and media literacy; computing, and ICT literacy; and career and learning self-reliance. All of these skills are addressed better through active inquiry learning and, over time, several skills are enhanced with its correct use, implementation, and facilitation (Lawson, 2009).

Due to the need for these new skills, new methods of learning are needed to prepare the twenty-first century learner. This is especially true in technology-driven learning environments where students or employees are required to interact using technology (Jacobson & Spiro, 1995). In cases such as these, active learning better serves individuals and groups by creating greater autonomy, mastery, and self purpose. As Daniel Pink (2009) has already noted in his book *Drive*, these are the primary means by which we are all motivated.

Whether it is learning in the classroom or in the workplace, the ability to remain motivated and master new skills is far better served with inquiry and inquiry action learning. Thus, to ensure that the adoption of this work is successful, one need contemplate numerous considerations.

Inquiry Learning in Higher Education

Inquiry learning has had many useful applications both in the classroom and the workplace. Highlighting basic fundamen-

tals of inquiry learning in the classroom will promote a simple implementation strategy for those wanting to further investigate inquiry learning within a higher education setting.

Numerous benefits to students can be explored, but the most profound reason for using inquiry learning in higher education is that when given greater autonomy, students are able to reach their own mastery of skills and content faster and, thus, give rise to a greater sense of purpose and ownership in their work (Pink, 2009). As a result many students who learn how to design and test their own thinking are far better prepared for real-life scenarios which arise most commonly in the workplace (Raelin, 2008). In fact, this was precisely the intention of inquiry learning in the first place. However, instead of inquiry learning helping students better understand science, as has been the case in the past, it is now helping students to better prepare themselves to handle real-life learning situations which occur more commonly in the workplace.

Students coming from traditional learning environments may take longer to grasp learning that occurs through inquiry because they are not prepared or accustomed to having the "driver's wheel" approach to learning. To be implemented effectively, inquiry learning requires greater discipline by the learner (Black & Deci, 2000). As a result students who have not experienced inquiry learning in the past may need to work together to support one another through this process or have a means of accessing mentor or coaching programs to support it. Support programs, such as Stanford's School of Business Volunteer Program, have shown to have tremendous success in this past decade in the higher education setting (Marquardt, 2004).

Some further best practices to consider when implementing inquiry learning in higher education classrooms include the following:

Provide greater student success through student "coaching" or "teaming." In using this approach, faculty will observe students reaching learning outcomes with greater success due to increased engagement (Datar, Garvin, & Cullen, 2010).

Faculty may need assistance in learning inquiry methods and how to facilitate inquiry learning well. A way to do this is to train instructors how to modify current syllabi into an effective inquiry-learning model of instruction. Faculty can learn how to conceptually design an inquiry course and use instructional strategies based on this model.

For inquiry design to be done well, the learner needs additional time to explore the core concepts being taught, and faculty need time to better align how the integration of new knowledge and approaches can be transferred into real-world situations and work-world scenarios.

Faculty can browse resources to learn more about inquiry design, but the best means to learn about inquiry is to gain actual experience with it. Having a focus on inquiry learning within faculty development at universities would provide the opportunity for faculty to experience the strategies they would need to implement in their own courses.

Moreover, the approach of integrating inquiry learning through faculty development allows for the evolution of current curricula into an ever more relevant and cross-dimensional study in the future. Having greater flexibility with curricula allows instructors to be more agile in educational delivery and thus works to ensure that higher education development remains on the cutting edge of innovation (Datar et al., 2010).

Future Research Directions

Many rich opportunities to support the improvement of the use of inquiry learning in higher education are available through relevant research efforts. Following are some areas that may benefit from such examination:

Real-time learning or “gaming” simulation models are examples of inquiry learning and are becoming a more popular means

of learning in the workplace and for students in the classroom, as described by Aldrich (2004). Expanding the research around virtual learning simulations would allow instructors to develop and use better models for reenacting business situations and environments than was previously possible. In such situations it would be interesting to see how the inquiry process could be enhanced through simulations, especially for project-based learning.

The focus of engagement as a student motivational tool is another emerging area of research which has strong roots in inquiry and active inquiry learning (Salmon, 2002). As noted previously by Pink (2009), engagement, or the means by which the organization and individual interact, will better serve student needs through the increased options provided by inquiry learning methods as compared to traditional learning (Pink, 2009). Experience and research are needed to find ways for students or employees to explore their own ideas.

Investigating how technology can help to support inquiry learning in the higher education classroom would provide additional strategies of value to students. More research is needed on how faculty can learn to diversify their skill sets to include inquiry learning in their repertoire of teaching strategies.

Conclusion

With new and diverging skills needed in the workplace, the higher education classroom should be a place for innovation in learning strategies. With greater understanding and experience, with inquiry learning, and with documentation of its effectiveness in the classroom, instructors should be able to improve student learning. Inquiry learning must be further developed at higher educational institutions that seek to provide real-world learning experiences. Not only will it serve the future of higher education well, it will work to prepare a more motivated, autonomous, and successful workforce for the future.

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