

For voices. this forms
the foundation of the

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For us to explore how inquiry based learning may be incorporated in to SESE curricular areas we must first investigate and clearly define what is meant by inquiry based learning. This essay will then examine and debate the advantages and disadvantages surrounding this approach and its comparison to problem based learning. Inquiry can be defined as a seeking of truth, information, or knowledge by questioning (WNET). Inquiry based learning is a process that is a lifelong skill, unbeknownst to most of us, that we must develop in school. Infants begin to make sense of the world around them through inquiry based practices. Babies observe faces that come near, grasp objects, put objects in their mouths, and turn their heads towards voices. This forms the foundation of the inquiry based learning process by gathering information through the use of human senses; seeing, hearing, touching, tasting, and smelling (WNET).

This natural instinct within us all must be capitalised upon to effectively incorporate an inquiry based learning approach into STEM subjects. This approach may serve to underpin high levels of student engagement, enjoyment, and excellent performance in STEM disciplines (STEM2016). Inquiry-Based Learning shifts the focus to curiosity and observations, which are then followed up with problem-solving and experimentation. Using critical thinking and reflection, students connect meanings from collected evidence and data, leading to an understanding and sense of the natural world around them. Compared to problem based learning, where problems are posed in such a way that students need to seek new knowledge before they can solve them, inquiry based learning provides a more active alternative. Rather than simply

seeking a single correct answer, students are enabled to interpret the problem, gather the information needed to identify possible solutions, and then evaluate options and present conclusions. The revised curricula in SESE allows a timely opportunity to introduce this new way of teaching, learning and assessment methodologies to enhance STEM education (STEM Education Review Group, 2016).

This approach is flexible in that it allows the teacher to design different learning environments along an inquiry continuum that best fits the context of the learning situation (Bianchi & Bell, 2008). Bianchi & Bell (2008) consider open inquiry to be the highest level of inquiry. This allows students to have the best opportunities to act like scientists in a SESE setting. Students are active in lessons and are encouraged to derive questions, design and carry out investigations, and communicate their results to each other and the teacher.

This level requires the most scientific reasoning and places greatest cognitive demand on students (Kuhn, 2005). Inquiry-based learning can help make connections within subjects throughout all SESE disciplines and the wider curriculum. Teaching specific content such as photosynthesis in science has more relevance for the learner if set in a larger context of understanding. Students must understand the relationship of the sun, plants, and the role of carbon dioxide and water.

History content, such as the industrial revolution, set in the context of interrelating changes in the human-designed world can add new perspectives to this important natural process. Students can still learn the content of both

science and history, but through a series of well-planned experiences, they will grasp the larger conceptual context and gain greater understanding of both (Mezirow, 1991). Within a conceptual framework, inquiry based learning and active learner participation can lead to important outcomes in the classroom.

Students who actively make observations, collect, analyse, and synthesize information, and draw conclusions are developing relevant problem-solving skills. These skills can be applied to future situations that students will encounter both at school and in the workplace (WNET). The advantages of inquiry based learning lie in its flexibility and its adaptable nature for a variety of projects. Allowing children to partake in this approach helps to build self-esteem and confidence by allowing them to be more active in their own learning process as opposed to being a passive participant to the teachers' lesson. Another major advantage is that this approach can work with any age group within a primary school setting and it serves to reinforce and build student skills from a young age (Gardner, 1983).

This approach also builds and reinforces skills of students in the area of physical, emotional and cognitive function. While there are many advantages to this approach, it is important to balance the argument and explore disadvantages relating to inquiry based learning. It is important to point out that this does not work for every SESE lesson. From a teachers' point of view, it involves far more planning and preparation, thus taking away important planning and preparation time from the teacher. This

approach can also be rather time consuming and may take away vital time from other subject areas within the school day (WNET).

Through the process of inquiry, individuals construct much of their understanding of the natural and human-designed worlds. Inquiry is not so much seeking the right answer, but seeking appropriate resolutions to issues and questions. For educators, inquiry implies emphasis on the development of inquiry skills and the nurturing of inquiring attitudes or habits of mind that will enable individuals to continue the quest for knowledge throughout their lives. The knowledge base for disciplines is continually evolving (Gardner, 1991). A primary school pupil cannot simply learn everything, rather, they can develop their skills and foster the inquiring attitudes necessary to continue the cultivation and examination of knowledge throughout their lives. In modern education, the skills and the ability to continue learning should be the most important outcomes. While much thought and research has been spent on the role of inquiry in SESE, inquiry learning can be applied to all disciplines (WNET).

This inquiry based practice transforms the learner from a passive to an active participant in the learning process. The teacher also moves from being an isolated subject expert to an instructional leader and learning architect for full pupil involvement. The goal of this approach is to improve learning by developing more self-sufficient learners who become increasingly responsible for their own learning. The vision, as pointed out in the quote to provide Irish students with a STEM education experience of high international quality can be attained in Irish primary schools, while underpinning high

levels of student engagement, enjoyment and excellent performance in the various ways pointed out in this essay.