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Integrated Inquiry into the Classroom for Inquiry Based Learning

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Abstract – In the sciences, inquiry-based learning has been widely promoted to increase literacy and skill development, but there has been little comparison to more traditional curricula. In this study, we demonstrated greater improvements in students' science literacy and research skills using inquiry lab instruction. We also found that inquiry students gained self-confidence in scientific abilities, but traditional students' gain was greater –likely indicating that the traditional curriculum promoted over-confidence. Inquiry lab students valued more authentic science exposure but acknowledged that experiencing the complexity and frustrations faced by practicing scientists was challenging, and may explain the widespread reported student resistance to inquiry curricula.

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INTRODUCTION

One of the best aspects of inquiry-based approaches is that they often lead to extended, ongoing investigations. Learning experiences that extend beyond one-off activities, that can be repeated or returned to, and that lend themselves to ongoing involvement, encourage deep learning.

The ongoing nature of such experiences ensures that children's engagement with them becomes deeper and richer. When children reflect on what they have done previously; plan for what they are going to do in the future; and have the opportunity to discuss, rethink and change their plans as they go, their learning and thinking becomes far more complex.

Enquiry-based Learning (EBL) is used here as a broad umbrella term to describe approaches to learning that are driven by a process of enquiry. The tutor establishes the task and supports or facilitates the process, but the students pursue their own lines of enquiry, draw on their existing knowledge and identify the consequent learning needs. They seek evidence to support their ideas and take responsibility for analysing and presenting this appropriately, either as part of a group or as an individual supported by others.

Inquiry-based learning (IBL) thus encompasses the INVOLVEMENT of the Learner in the learning process, leading to his understanding of the key ideas. Inquiry implies the DESIRE TO KNOW or A PERCEIVE NEED TO KNOW from the part of the learner.

Inquiry-based science learning involves the pursuit of Open-Ended questions and is driven by Questions generated by learners. In IBL, the learner will learn to pose researchable questions and pursue them through open-ended investigations.

Inquiry thus involves a complex thinking process when a learner attempts to convert the information presented by the educator to useful, applicable knowledge. His understanding is often demonstrated through presenting a series of questions that have a framework, a context and a focus All these will help the learner develop an understanding of the key topic, allowing him to synthesize new knowledge from this understanding ('internalising' the knowledge) IBL is thus A Curriculum Development and Delivery System that recognises to need to INVOLVE the learner and facilitates UNDERSTANDING.

INTEGRATING INQUIRY INTO THE CLASSROOM

The process for integrating inquiry into your course contains phases that are similar to those used in the design of any course: determining your goals and objectives; an analysis of your potential students (their experience, prior knowledge, and academic level); your role in the learning process; developing an instructional plan; and designing activities, assignments, and assessments. As you proceed through each phase of the process, keep in mind that your teaching method (IBL) and all of the activities, assignments and assessments.

CHARACTERISTICS OF ENQUIRY-BASED LEARNING

We can summarise some of the characteristics of EBL as follows:

- Engagement with a complex problem or scenario, that is sufficiently open-ended to allow a variety of responses or solutions

- Students direct the lines of enquiry and the methods employed

- The enquiry requires students to draw on existing knowledge and identify their required learning needs

- Tasks stimulate curiosity in the students, encouraging them to actively explore and seek out new evidence

- Responsibility falls to the student for analysing and presenting that evidence in appropriate ways and in support of their own response to the problem EBL offers flexibility to develop a range of abilities, including those required for lifelong learning:

- The modern economy places a premium on the ability to create knowledge; open enquiries allow the development of this skill and other key transferable skills

- Leadership skills in managing complex enquiries and projects are particularly important in employment

- The focus on enquiry helps in synthesising learning, which can be an issue in modular and inter-disciplinary programmes; enquiries typically cross 'boundaries'.

KEY ATTRIBUTES OF INQUIRY-BASED LEARNING

Given that IBL needs a dynamic contribution from the learner and the announcement of comprehension on crux thoughts, we have comprehensively incorporated two major prerequisite of a fruitful IBL curriculum:

a. The Need to Involve the learner

b. The Need to push Understanding from the learner

With the end goal of this examination, we recommend an altered 5Es Model for science IBL. As demonstrated in the chart beneath, this model involves 5 stages, which could be comprehensively gathered to satisfy both guideline prerequisites of IBL: the necessity to Involve the learner and the requirement to push Understanding from the learner, through Involving the Learner : A Learner just wishes to be included in the studying technique when he is really intrigued by the studying experience. The support for including the learner in this way rests on the requirement to propel and captivate the learner in the crux thought to be talked over.

Whilst in the perfect situation, a curriculum could be planned and achieved to suit the studying investment of each single, in practice, the instructor could endeavor to adjust the investment of his people in the classroom, through the imaginative provision of different instructing assets and the suitable arrangement of studying encounters.

There are numerous routes to realize this conclusion. For outline purposes, we will depict the accompanying techniques that have been indicated to be remarkably fruitful in captivating the learner to figure out progressively on the point to be talked about:

a. Embracing a Thematic Approach to reconcile different disciplines. Utilizing topics permits the instructor to mix different restrains in a seamless and exceedingly captivating design, in this manner permitting the learner to treasure the interconnectiveness of diverse restrains in any given subject. A broadening of this approach includes the performance of ideas and situations to include the understudies at the starting of the lesson, aiding 'purchase-in' for what they are going to study.

b. Utilizing Authentic Examples to show the idea. Utilizing bona fide samples could be quite adequate in expediting the learner's cooperation of any given thought to his day by day life. This is frequently incorporated in a thematic setting to help improvement of paramount aspects of comprehension for example requisition, view and compassion (see area on Promoting Understanding).

c. Starting the lesson with a captivating exhibition. One of the favorable circumstances that encompass the instructing of science is includes the capacity of the learner to be captivated by watching an enticing marvel that exists in nature. Dynamic notions for example the different lands of air might be promptly showed to the understudies in the lab without utilizing greatly complex instruments. Once the learner perspectives the sensation with wonderment and wonderment, helping him grasp the underlying ideas could be finished no sweat.

d. Utilizing intelligent educating materials (I-Board). Our encounter with understudies matured 6 to 17 have uncovered that when qualified data is exhibited to them in a greatly intelligent mold through the machine or the utilization of the I-Board (an intuitive whiteboard), they end up being greatly occupied with the methodology of studying, making the technique remarkably agreeable for both the teacher and learner.

e. Active Activities. Science lessons include an extraordinary product of experimentation to "uncover the truth" of distinctive regularly happening phenomena. The aforementioned exercises, when structured as significant intends to help the learner actualize a certain target and coupled with a skillfully-planned set of inquiries, could be greatly adequate in pushing investment and all the more essentially, comprehension in the theme to be examined.

Promoting Understanding : A studying trip can't be confined to the digestion of methods essentially. It is in this manner crucial to guarantee that learners be engaged with the UNDERSTANDING OF THE RELEVANT CONCEPTS. Scholars may as well accordingly be challenged past information of truths however learning of why and how overlaid with fitting thinking and generally-upheld with proper proof. This, in turn could be exhibited by the members in the emulating six aspects of comprehension as recommended by Wiggins & McTighe (1999) 1:

a. EXPLANATION: Gaining profound and expansive learning of hypotheses to legitimize noticeable phenomena

b. INTERPRETATION: Demonstrating capacity to give importance from the information gave.

c. APPLICATION: Applying the information of ideas talked over adequately in new scenarios and connections.

d. PERSPECTIVE: Able to give discriminating and canny perspectives on different issues to that encompass the nexus thought talked over.

e. EMPATHY: Demonstrating the capacity to comprehend an additional individual's outlook, particularly any time talking about socio-moral issues that encompass the cutting edge requisition of a percentage of the notions talked about.

f. SELF-KNOWLEDGE: Demonstrating comprehension of one's lack of awareness in comprehension and how one's private experience and thought designs could impact his comprehension of matters.

The 16 Habits of Mind2 : A Habit of Mind could be comprehensively described as the aspects of what a clever individual may do when stood up to with situations to which the result may not be obvious. While endeavors to arrange the aforementioned propensities, one ought to relish that the essential reason for this practice is to help us better comprehend a portion of the perceptible behaviours of a learner when he faces a situation, along these lines encouraging us to promptly figure out assuming that he has grasped the notion.

Propensities of Mind are occasional performed in detachment---a learner will normally show a group of propensities when went up against with any given situation. In the same way, every Facet of Understanding (see past segment) could be went with by a showcase of more than one Habit.

The 16 Habits of Mind are:

1. Persisting
2. Managing Impulsivity
3. Listening to others --- with Understanding and Empathy
4. Thinking Flexibly
5. Thinking about our Thinking (Metacognition)
6. Striving for Accuracy and Precision
7. Questioning and Posing Problems
8. Applying Past Knowledge to New Situations
9. Thinking and Communicating with Clarity and Precision
10. Gathering Data through All Senses
11. Creating, Imagining and Innovating
12. Responding with Wonderment and Awe
13. Taking Responsible Risks
14. Finding Humour
15. Thinking Independently
16. Learning Continuously

What Does an Inquiry-based Classroom Look Like?

In an inquiry-based classroom, most decisions that teachers make, from choosing wall displays and onfiguring students' desks to reserving a gathering place for class discussions, is based on their desire to put the principles of Inquiry and Knowledge Building into practice. Teachers, therefore, continuously strive to balance what is practical with the following considerations:

• *Is this conducive to creating an environment where students' ideas and thinking will be at the centre?*

• *What message will this send to the students about my own values about learning?* Classroom walls

• At the start of the school year: The walls of an inquiry-based classroom are quite bare, aside from perhaps a welcoming visual display of children's names. Few, if any, prepurchased teaching visuals are on display. The reason? Teachers want their students to understand that the classroom belongs to the whole community of learners, not just the teacher. The walls serve as blank canvases to be filled with students' questions, ideas, and multiple expressions of understanding.

• **Throughout the year**: Representations of student learning – as expressed in art, writing, sculpting, and building – are displayed on walls throughout the classroom. A prominent section of one wall is devoted to the questions, ideas, and theories that have emerged from Knowledge Building Circles. The purpose of this display is not to showcase the 'best' work, but to archive all ideas, including the less accurate or developed. This approach also makes the growth of students' understanding over time explicit.

Such egalitarianism serves to reinforce values such as respect for diverse ideas, thereby creating a culture of psychological safety that is integral to learning. Students are more likely to "feel safe taking risks, asking questions, revealing ignorance, voicing half-baked notions, and giving and receiving criticism" (Scardamalia, 2002, p. 9). They come to understand the value of questioning, thinking critically and contributing ideas. They learn that producing the correct answer or end product is not the full measure of learning success. By extension, they come to appreciate their own value as learners.

CONCLUSION

We believe that an Inquiry-based learning approach is instrumental in help educators today to teach less and students learn more. Whiles the examples presented in this paper have been restricted to life sciences and technology contexts, we believe that the instructional and curriculum design models suggested in this paper could be applied to helping educators refine their curriculum in this exciting era. We look forward to opportunities to collaborate with more educators in the region.

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