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Statement of participation

MOHAMMED FAHIM N

has completed the free course including any mandatory tests for:

Primary science: supporting children’s learning

This free 8-hour course explored how to support primary-aged children in learning science.

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https://www.open.edu/openlearn/education-development/education/primary-science-supporting-childrens-learning/content-section-0

COURSE CODE: **E209_1**

Primary science: supporting children’s learning

https://www.open.edu/openlearn/education-development/education/primary-science-supporting-childrens-learning/content-section-0

Course summary

Science is a key subject area in primary education curriculum frameworks. This free course, Primary science: supporting children's learning, provides an opportunity to consider your own experiences, perceptions and attitudes to science. You will explore and develop some of your scientific knowledge and understanding while considering how you can support primary-aged children's science learning.

Learning outcomes

By completing this course, the learner should be able to:

- evaluate and advance science subject knowledge
- reflect upon some key scientific concepts and skills relevant to children’s learning in the primary years
- consider what can make science difficult or easy to learn, and explore some common misconceptions about science and how they can be addressed
- reflect upon the importance of promoting positive attitudes to science and making children’s science learning meaningful, relevant and engaging
- use and evaluate some different approaches to teaching science, such as those involving concept maps and modelling.

Completed study

The learner has completed the following:

Section 1

Science subject knowledge

Section 2

Subject knowledge and teaching and learning

Section 3

Discovering children’s ideas

Section 4

Using models in science

Section 5

Conclusion

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COVER PAGE AND DECLARATION

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I confirm that this assignment is my own work, is not copied from any other person's work (published/unpublished), and has not been previously submitted for assessment elsewhere.

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Introduction

The quality of science education, like mathematics education, is a constant concern for educational improvement efforts. The cognitive approach to teaching subject matter is what Carey uses to explain science education. The idea of understanding something is the starting point for this orientation, integrating it with existing knowledge schemas is necessary. The purpose of science education is to impart new schemata to replace students' existing ideas, making it a paradox. The resolution of this paradox establishes the foundation for current science education research. Studies reviewed by Carey show the extent of the mismatch between the student's schemata and the expert's schemata. She explains their impact on instruction and cognitive theories of learning. The comparison of different characterizations of the differences between naive and scientific explanations includes the view. The knowledge of the novice-expert shift can be gained from cognitive science literature, the history of science on theory change, and science educators, as well as Piaget's writings important Concepts Learned from Assigned Reading.

Main Body

Important Concepts Learned from Assigned Reading

Physical, biological, and social worlds and we want to teach at least some aspects of that understanding to youngsters by our scientific heritage. Our objective is for them to comprehend the scientific process, specifically how it contributes to a scientific understanding of the natural world. The instantaneous lessons of the research on reading are clear. Students studying a science text or concentrating to a science teacher must gain understanding by relating what they are studying (hearing) to what they know, and this essential active, practical work. This is perceptional rationale for making science lessons pertinent to students' concerns. When it comes to gaining understanding of a science text, the 'serenade' example is fundamentally misleading. Students in science learning lack schemata like the serenade to use as a foundation for their understanding.

The paradox arises when one tries to understand text or spoken language without connecting it to schemata for understanding the world. The objective of science teaching is to provide students with new understanding schemata that are not already in their repertoire. So how is the student to understand the texts and lessons that impart the new information? This contradiction is real, and failure to catch. Many of the current problems in our science curriculum stem from its full import. It has been observed that junior and senior high school textbooks frequently introduce more new vocabulary per page than foreign language textbooks.

The concepts expressed by new words in foreign language texts are already familiar to the student, as they already operate in mentally represented schemata. But this is not so for new scientific meaning. Science lessons that focus on vocabulary are a recipe for disaster, especially if understanding is the objective. The full extent of students' lack of understanding of what they have been taught in science has only just become apparent. Cognitive scientists and educational researchers have independently discovered phenomena that demonstrate this lack in a significant way.

Our discussion thus far has focused on the difference between the student's conceptual frameworks for explaining natural phenomena and the expert's. We gain insight into the obstacles students encounter in comprehending newly presented scientific knowledge through this analysis. Piaget's perspective on the obstacles to learning in young children was quite distinct. Piaget taught us that young children have a fundamentally different way of thinking and Adult learners report that they think in concrete terms, are unable to represent concepts in the scientific structure, and are limited in their inductive apparatus, and so on.

According to his stage theory, the child's conceptual machinery undergoes several basic reorganizations, including the switch from sensory motor to representational thought and the transition from pre-logical to early concrete logical thought, and finally to the total recall of adults. These shifts are domain independent in Piaget’s system. That is, they were meant to explain the child's limitations in learning new information with certain formal properties, no matter what domain of knowledge that information pertained to.

Piaget's stage theory has come under fire and has been abandoned by many developmental psychologists. It is probably fundamentally misleading according to Carey at 1985 a, Gelman & Baillargeon, 1983, for reviews. That is, many developmental psychologists now believe that the young child does not think differently from the adult, is not concrete, illogical, and so forth. Phenomena that were interpreted in terms of Piaget's stage theory are better interpreted in terms of specific alternative conceptual frame works m novice-expert shifts and theory changes in particular domains.

Utilisation of Key Concepts Learned at and within Workplace Contexts

The study of conceptual change in the history of science has led to a much more radical view of restructuring of knowledge (Feyerabend, 1962; Kuhn, 1962; Toulmin, 1953). The original formulations of this radical view embraced a kind of meaning holism in which the meaning of each concept in a theory is determined by its relations with all other concepts in the theory. In this view, any theory change necessarily involves conceptual change. This view has other consequences: that successive theories are incommensurate and that each theory is unfalsifiable. These extreme formulations have been rejected by most philosophers of science according to Suppe, 1974, for extensive discussion, but a strong view of restructuring has survived, one that allows for true conceptual change among core concepts of successive theories. In the strong view, successive conceptual systems differ in three related waysmin the domain of phenomena accounted for, in the nature of explanations deemed acceptable, and even in the individual concepts in the center of each system. These three types of differences sometimes result in one theory's terms not even being translatable into the terms of the other (Kuhn, 1982). For example, in successive theories of mechanics each of the core terms, such as force, velocity, time, and mass, has fundamentally different meanings in the earlier as compared to the later theory. As an example, consider the concepts motion and velocity in Aristotelian and Galilean mechanics. For Aristotle, motion included all change over time--movement, growth, decay, and so on.

He distinguished two fundamentally different types of motion natural and violent. His physics accounted for the two in quite different ways. Natural motions included objects falling to the earth, smoke rising, plants growing, and so on and were explained in terms of each kind's natural place or state. Violent, or artificial, motions were those caused by an active agent, such as the movement of a person or the heat of a fire, and were explained in terms of entirely different mechanisms. Galileo, in contrast, restricted his study to movement through space, saw that the distinction between natural and violent motion was a distinction without a difference, and collapsed the two kinds of motion, bringing both into the domain of a single mechanical theory. Galileo's system had no concept of natural place or natural state. Moreover, Aristotle did not distinguish between average velocity and instantaneous velocity the key distinction that got Galileo's kinematics off the ground. These changes at the level of individual concepts are the reason that the core terms of Aristotelian mechanics and Galilean mechanics are not inter - translatable. The changes from Aristotelian to Galilean mechanics did not come easily. One cannot understand the process by which they occurred without considering the changes in the whole theory--in the domain of phenomena to be explained and in the kinds of explanations considered acceptable. All three kinds of change min domain, concepts, and explanatory structure---come together. Change of one kind cannot be understood without reference to the changes of the other kinds.

I have contrasted two different meanings of "restructuring' the first, weaker meaning is that set out in Chi et al. (1982). With expertise, new relationships between concepts are represented, and new schemas emerge that enable the solution of new problems and change the solutions to old problems. The second, stronger sense encompasses not only these types of changes, but also changes in the individual core concepts of successive systems. Analysing conceptual change is extremely difficult. I will not attempt to establish criteria for determining whether a particular case of restructuring involves this kind of change. Nevertheless, looking at clear examples such as the transition from Aristotelian to Galilean mechanics can help us to decide other cases. In this transition, several differentiations and mergers occurred, both of which are paradigmatic cases of conceptual change. Moreover, the ontological commitments of the theories differ. Aristotle held on to the existence of natural places and natural states because these played a central explanatory role in his theory.

But Galileo's theory denied the existence of such entities. The only way to make sense of these changes—differentiations, mergers, and shifts in ontological commitments—is to consider how the domains and causal notions of succeeding theories have changed. We may be sure that the knowledge restructuring in question is of the stronger form, involving conceptual change, if all these modifications are discovered. For cognitive scientists, the way historians and philosophers of science have discussed theory change presents a question. Does conceptual change occur when an adult transitions from novice to expert? There are good reasons to be skeptical of this. There are many interesting instances of mature scientists developing conscious theories over years or even centuries in the history of science. But new research by students on novice-to-expert changeover indicates that learning a new science does cause this kind of reconfiguration. Physical causality, according to Larkin (1983), is best understood by beginners as the temporal propagation of physical effects. Equations of state are used by specialists to explain happenings under similar circumstances. A comparable shift in the historical development of thermal theories throughout the century between Galileo and Black was noted by Wiser and Carey (1983).

According to McCloskey and his colleagues (e.g., McCloskey, 1983), a beginning mechanics student approaches his study of mechanics in school with a theory of mechanical phenomena that is the same as the pre-Galilean momentum theory of the Middle Ages. This assertion is supported by the misunderstandings. The momentum applied to the coin during its toss is the beginner's upward push; after the ball clears the cliff, it is the horizontal momentum that keeps the trajectory horizontal. It is because studying mechanics demands a paradigm change of to, if not more than, that of Galileo, from impetus theory to Newton. This explains why students' misconceptions are so resistant to tutoring If McCloskey is right, there is a significant restructure including conceptual change since the fundamental ideas of Newtonian mechanics become unstable in terms of the ideas of pre-Galilean impulse theory due to several concurrent modifications at the level of individual conceptions. We can now see the actual significance of researching student misconceptions. Indeed, they demonstrate the shortcomings of our curricula. More importantly, they offer a hint as to what the student's nature understanding schemas contain and how they diverge from those of the expert. Without a thorough comprehension of the breadth and depth of the students' prior knowledge, we are unable to influence scientific understanding. The curricula of high schools and colleges provide the aforementioned instances of conceptual shifts that occur throughout the acquisition of scientific information. In two case studies of childhood knowledge restructuring that were just published, my colleagues and I made the case that conceptual change is a necessary part of cognitive growth. Carey (1985b) conducted an analysis of the interconnected shifts in the conceptions of animals, people, plants, living things, death, reproduction, gender, and other notions between the ages of 4 and 10. The conclusion of the study was that at this time, an intuitive biology emerged as a separate field of study. The small toddler does not distinguish between the terms "dead" and "inanimate." These ideas are only ingrained in an intuitive psychology around the age of 4. Since inanimate objects and dead things cannot behave, biological relationships like parenthood are regarded as social relationships. In this context, the brain misunderstandings outlined by Johnson and Wellman (1982) should be viewed. Comparably, Smith, Carey, and Wiser (1986) reported on the differentiation of weight and density during these same years and contended that this childhood case needs to be described using the same differentiation analysis that works in historical cases (e.g., Black's differentiation of heat and temperature; see Wiser & Carey, 1983). In the process of creating an intuitive understanding of matter, the differentiation takes place. Numerous misconceptions were observed by Piaget and Inhelder (1941) and Smith et al. (1986).

Potential Challenges Faced in Implementing these Concepts in the Workplace

Undoubtedly, there is truth to some form of the "alternative conceptual framework" viewpoint. I've made the point that it's critical to identify which of the several versions is accurate in each situation and to clearly describe them. The representational difficulty and the mechanism-of-change problem are the two additional difficulties I perceive. To be able to evaluate conceptual restructuring, we first need to create far better ways to express conceptual structures. Secondly, we need to create theories about what drives change.

Conclusion

To summarise, In our opening paragraph, we stated that it is incorrect and foolish to prioritize science understanding over reading comprehension. According to the research discussed here, one promising strategy for advancing both types of literacy is text comprehension, especially when it comes to texts meant to foster conceptual transformation. Understanding and conceptual change are likely to occur for readers who attempt to understand rebuttal texts by preserving coherence or resolving cognitive conflict. Consequently, it is expected that increased integration of research and instructional practice in these two domains will promote the development of scientific literacy as well as comprehension. Lately, there has been a crucial theoretical and practical convergence of research in the fields of comprehension and conceptual change. Theoretically, study in each field may increase our understanding of both text processing and knowledge reorganization by advancing our understanding of the mechanisms underlying both processes. Practically speaking, science and literacy instruction can benefit from the integration of understanding and science subject training. It can also enable teachers devote more instructional time to teaching science topic. Future studies combining comprehension and conceptual transformation research should be beneficial for scientific education as well as other subject areas, we hope.

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