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Educational Psychology Principles that Contribute to Effective Teaching and Learning

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- *This paper discusses five principles that contribute to student achievement. For each principle the research upon which it is based is summarized and explanations for how and why teachers could implement the principle are explored.*

Introduction

Preparing children and youth for success in the 21st century is an issue that is of increasing concern. During the 20th century, the movement from a national agricultural and industrial-based economy to a global information-based economy placed increasing demands on everyone to develop the necessary knowledge, attitudes, and skills for a rapidly changing world (Huitt, 1995). While much of the effort of educational reform and renewal has focused on the development of students' basic skills (Barrett et al., 1991; No Child Left Behind, 2002), others have argued for the need to establish a larger set of knowledge and skills if students are to be properly prepared (The Secretary [of Labor's] Commission on Necessary Skills [SCANS]), 1991). However, even critiques of that report agree that basic skills are necessary, though they may not be sufficient, preparation (Huitt, 1997).

Research has demonstrated that many variables are related to basic skills achievement as measured by standardized tests. In addition to the much discussed variables related to teacher characteristics and classroom practice (Darling-Hammond, 2000; Wenglinsky, 2003), research has also shown that variables such as school size (Howley, 1997), family characteristics (Zill, 1992) and type of community (Coleman et al., 1966; Hatch, 1998) make significant contributions to explaining variances among students' achievement. Some researchers argue that it is the interaction of all of these (Epstein, Coates, Salinas, Sanders, & Simon, 1997) and, therefore each should be held accountable for adding value (Huitt, 1999).

In this paper we present several principles that quality research shows teachers can use to make their contribution to student achievement. For each principle we summarize the research upon which it is based, and explain how and why teachers in any grade or academic subject can implement the principle.

Setting the Stage for Learning

There are many instructional methods. These are often combined and include: whole group instruction, individual instruction, using objectives to guide instruction, discovery/inquiry, learning styles, cooperative learning and tutoring, CAI, enactive, mastery, direct instruction, and thematic approaches. Any teaching method one uses can be made more effective when educators make certain their lesson plans also incorporate several overarching considerations. These are objectives, an advance organizer at the beginning of each day's lesson (Ausubel, 1978), a comprehensive review of the lesson's pre-requisites, connections that tie new information with older, teaching small pieces of content at a time and having students actively engaged with the material (Rosenshine, 1986; Rosenshine, 1997; Rosenshine & Stevens, 1986).

Advance organizers (AO) and reviewing pre-requisites are designed to activate students' prior knowledge about a topic and make them more sensitive to information as it is presented during the lesson. AOs summarize the major points that will be made in the lesson, and connect some of the points to information students already possess. AOs usually only last about a minute and are followed by the day's objectives.

If students do not have, or cannot retrieve from memory, the required background information and skills, they will not be able to learn the new content as well as they should. Reviews help students remember related information and provide opportunities to acquire skills if they are not present. Such reviews normally take only several minutes and can become a basis for connecting older content with new. When teachers find that students do not have the pre-requisites, they should extend the review to ensure that students acquire the content and skills.

"Connections" involve relating new information with existing information. Students need to be shown several ways in which new content is tied to other content, and teachers must do this both in the AO and in the lesson. This, however, is not enough. Teachers, in their presentations and assessments, must also require students to develop additional connections beyond those illustrated. Connections are critical because they enhance the content's meaningfulness to students and make it more easily retrieved.

Instructional Outcomes

A teacher's instruction and assessments should clearly and directly relate to objectives. Objectives explicitly define what students are to learn, and where teachers should focus engaged time. Objectives come in different forms with overlapping names. The label given to an objective is not important if it clearly states what the student must do, how well (s)he must do it, and where/when and with what materials. Too often, educators employ, without operationally defining, buzz words in their objectives (e.g., appreciate, know, understand, evaluate) that do not convey exactly what the students are to say or do to demonstrate that they have learned the content (Gage & Berliner, 1991, p. 35).

Research studies cited by Gage and Berliner (1998), Gonlund (1998) and Slavin (2003) all show that when teachers develop, communicate, teach, and assess from well-written objectives, student achievement increases. Preparing specific objectives requires more work on the part of the teacher. However, writing objectives helps the teacher clarify the concepts that are to be covered and emphasized in class, helps the teacher clearly articulate those concepts to students, and provides a firm foundation for the development of assessments.

One common criticism practicing educators level against developing and communicating clearly stated objectives is that while students who receive such objectives score higher on assessments tied to the objectives, they score lower on items not related to the objectives. The obvious solution to this dilemma is simple: Teachers should also develop objectives for the content identified as incidental.

After developing sequenced objectives one needs to examine each to determine at which level of the Bloom, Englehart, Furst, Hill, and Krathwohl (1956) cognitive taxonomy or the revised taxonomy developed by Anderson and Krathwohl (2001) students are required to perform. Pinpointing which level of the taxonomy an objective requires is important because critical thinking skills, those associated with the application, analysis, synthesis, and evaluation levels of the taxonomy, have to be taught and frequently assessed if our students are to develop these skills (Bushell & Baer, 1994; Hummel & Huitt, 1994).

Information Processing and Memory

Cognitive science has been one of the most fertile and innovative areas of research over recent decades. Atkinson and Shiffrin (1968) wrote a seminal article describing a three-stage model for how humans take in, process, remember, forget, and use information.

The first important teaching principle based on this model is that teachers must get students' attention if they are to move information from the first stage (i.e., sensory memory) to the second stage (i.e., short-term or working memory). If this is not accomplished, students have nothing to process and learning does not occur. Two additional principles relate to the fact that short-term memory is quite limited (Miller, 1956). Classroom teachers know from their own intuition that short-term memories of concepts and skills students learn are quickly forgotten. The first principle related to short-term memory is arranging content in an organized manner so that students come into contact with small pieces of information they can later combine (or chunk) into larger systems of knowledge. A second principle is planning for opportunities to practice information. While this is not sufficient for it to move to permanent storage, it can help keep it in students' short-term memories long enough for them to work on it.

For students to learn and apply concepts and skills in their lives, information must be stored in the third stage, long-term memory. The basic principle related to long-term memory is elaboration and teachers might consider planning activities that allow students to actively process the information by summarizing and paraphrasing, developing mnemonics to help

them learn and remember, and connecting the new information with existing information.

Value of Learner Diversity

Maya Angelou has been quoted as saying, "we are more alike than different my friend." This statement can be interpreted in educational settings to mean that students have far more similarities than differences and we need to help them recognize these similarities in one another. In 1997, The American Psychological Association created a document entitled *The Learner-Centered Psychological Principles: A Framework for School Redesign and Reform*. This document attempts to redress low academic achievement by utilizing the diversity of students to help enrich learning and encourage school reform. This report produced three main principles related to diversity that influence teaching at the classroom level: (a) students utilize different approaches and have different capabilities for learning that are influenced by experiences, culture, and heredity; (b) learning is maximized when students' and teachers' linguistic, cultural, and social circumstances are considered; and (c) teachers and other educational professionals need to set high and challenging standards and utilize formative and summative evaluations to help students increase their achievement.

Assessments Increase Learning

Formal and informal assessments, to be valid and equitable, must follow Gronlund's (2000) points for achievement assessments. First, only assess content and skills for which there are objectives that were both taught and communicated to students. Second, the weight of each assessment item should be proportionate with the amount of time spent on the content during class. Third, the assessment items should fit the purpose for which they were developed (e.g., an informal assessment might attempt to identify objectives that students need more class time to master). Fourth, assessments should consist of appropriate items. For example, to cover a lengthy topic, objective-select items would cover more objectives than an essay could in the same amount of time. An essay, however, might be more appropriate for measuring students' ability to relate new content to that covered in previous lessons, or to help develop students' writing skills. Fifth, assessments should be reliable, and, sixth, should improve student learning. In addition to those six points, there is another concept we call "more is better." More frequent assessments over smaller amounts of content increase student achievement (Bushell & Baer, 1994).

Summary and Conclusions

Barrett, Beck, Binder, Cook, Engelmann, Greer, et al. (1991), wrote an eloquent essay stating that all children in American public schools have a right to an effective education. Several decades of educational research have yielded data-based methods and materials to accomplish this seemingly lofty goal. However, classroom teachers should not be held solely responsible for student achievement as measured by standardized tests of basic skills. As discussed, there are a number of factors outside a teacher's control that impact those scores. It is an axiom of management that one should not be held accountable for that which he is not responsible. Teachers should be held accountable for their professional classroom practice; no less and no more.

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