

RUNNING HEAD: SUBJECT SAMPLER AND THEORY

The subject sampler: Applying the Information Processing Theory and Advance
Organizer Principles to the Online Classroom

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Abstract

This paper focuses on using a subject sampler to incorporate major components of the information processing system and advance organizers into an online course. This paper should help teachers develop ideas that enhance encoding, and provide a method by which they can build bridges between both isolated content within teaching units and student's prior knowledge and the new information.

Introduction

The use of the World Wide Web for promoting learning holds great potential for both students and faculty. However, it is important that pedagogical techniques used in this environment are appropriate for teaching and learning. Teachers and researchers should combine knowledge in efforts to test traditional educational approaches for their fit in the online environment. Furthermore, the literature should be thoroughly reviewed in efforts to link existing educational and psychological theory to the practice of teaching and learning online.

The theoretical approach to cognitive development that has been called the Information Processing Theory (IPT) and the educational tool, the advanced organizer, are two such traditional items that hold particular promise for an online classroom. This paper reviews how one web-teaching tool, the subject sampler, combines key components of both the IPT and the advance organizer.

A subject sampler can be defined as an interactive web activity that gives students a small number of web sites organized around a main topic. Its purpose is to interest and involve students in the subject matter presented, link prior knowledge to the course material, and provide a cognitive web for students. “Subject samplers work like those chocolate samplers: you open the box, look things over, think you can see something you’d like, then poke your finger into it. If you like it, you eat it. If you don’t you leave it poked into for someone else to try.” (March, 2002).

Although the web is full of subject samplers and directions on how to create one, work on the educational justification for this tool are rare even by the most liberal standards.

The Information Processing Theory

The Information Processing Theory (IPT) finds its roots in the processing components of a computer. Like a computer, the human mind takes in information, performs operations on it to change its form and content, stores and locates the information, and generates responses. Like a computer, the brain performs these operations using a limited amount of processing capacity (Atkinson & Schiffrin, 1968).

Successful teachers have long made use of various elements of the Information Processing Theory to promote encoding, retention, and retrieval of information. Some methods that have evolved include brainstorming, reviewing chapter outlines, creating webs of connecting ideas, providing repetition, and various other methods designed to help students organize and retain relevant information.

The importance of an organism's activities/processes in memory are a key focus of the IPT. Craik and Lockart (1972) hold the belief that deeper and more semantic levels of processing are linked with greater memory. IPT designates the long-term memory as the storage unit to which the brain refers to when retrieving information from memory (Simon, 1972). Studies show that students are more likely to retain material when information is processed more deeply as opposed to a shallow level of processing (McDaniel, Einstein, Dunay, & Cogg, 1986). Deeper processing is often found to occur when incidents are related to what one already knows (Byrnes, 2001).

The IPT also supports the idea of learning and memory, based on the gradual accumulation of experiences. Findings suggest that a certain period of time must elapse before records are made permanent (Byrnes, 2001).

Using the information processing theory as the underlying principle, several methods of teaching have evolved which have the optimal processing of information at their core. The advance organizer is just one of these methods. In this method, Ausubel, (1960) proposes that presenting subsumers before the actual instruction serves to change the cognitive structure in a way that it can more appropriately fit the new information.

The literature on advance organizers

Advanced organizers are generally defined as introductory prose passages that are written at a higher level of generality and inclusiveness than the actual learning material (Ausubel, 1960). Some researchers have expanded the definition to include more than prose, but graphics as well: concept maps, diagrams and pictures, and hierarchy structures. These methods use graphics to indicate relationships between concepts (Platten, 1991).

Regardless of the type of advance organizer used, there is much debate over the effectiveness of this tool to advance the retention of information. Perhaps one reason for the discrepancies in the literature must be context. The context in which an advance organizer is often employed can vary to such degrees that comparing one advance organizer to another is to compare apples and oranges. The context can vary from course material, to type of advance organizer, to age of participants, to quality of the advance organizer and so on. The following paragraphs will review several of these studies.

A study by Bricker (1989), compared abilities to complete hands on science projects with an advance organizer and without. This study found no significant difference in the abilities of the two groups. In fact, students provided with the advance organizer were somewhat confused about its use. Peverly (1981) found that presenting pictures before reading a text did not increase retention of the text. McAdaragh (1981) found that advance organizers had no effect on the achievement of science students even when coupled with prior knowledge at three levels of experience.

Despite these findings not supporting the benefits of using advance organizers, there are still many studies that promote its use as a cognitive tool when used appropriately. Note the various contexts in which all of these studies, both for and against the use of advance organizers are done.

David Ausubel is perhaps the most widely quoted scholar and supporter on the subject of advance organizers. In 1978, Ausubel addressed several issues of concern. Mainly, he addressed the fact that many critics have varying concepts of what an organizer is. In his defense, Ausubel clarifies the definition of the advance organizer and defends it. He continues to support its use by citing several studies, which he believes successfully, use the advance organizer and find it an effective teaching tool. Ausubel continues to support the advance organizer for its pedagogic effectiveness.

Stone's (1983) meta-analysis of advance organizers, which included 112 studies, show advance organizers to be associated with increased learning and retention of material. Stone suggests that advance organizers are effective in providing a framework for incorporating new material into students existing cognitive structure.

Kirkland (1981) found that frequent use of advance organizers significantly improved reading comprehension. West (1981) tested the advance organizer on the meaningful learning of intellectual skills and found that advance organizers enhance learning skills.

Darch and Carnine (1986) found that visual advance organizers worked better with disabled students than textual organizers. Hawk's (1986) research also provides support for the use of graphic organizers with students. In Gennaro's (1981) studies on pre-visit instructional materials on learning for a museum field trip, he found a significant increase in student test scores by students who were provided with the advance organizer.

Adamson's (1980) use of pre-reading questions exploring the reader's opinions encourages the evaluation of the material and text as it is read. This encourages prediction and reflection. Adamson's work also provides support for the use of advance organizers and pre-reading questions as a way to mold course content to the student's current knowledge structure and goals. This is an especially important consideration when teaching adult learners.

Thompson's 1998 studies also provide strong support for using advance organizers with adults. Thompson's studies suggest that adults can specifically benefit from advance organizers especially with recognition tasks. This supported the hypothesis that older learners do not spontaneously organize new information as well as young people do. This theory sheds light on the advance organizer studies that found advance organizers to be fairly useless with young learners based on the idea that these learners were creating their own organizational structures and a teacher or researcher developed advance organizer was a hindrance to this process.

A study by Bills (1997) focused on the effects of structure on Internet-based instruction. Structure was defined in this study as, “an instructional strategy that shows students how the instructional material is organized and how it related to what they have previously learned”. Bills found the effects of structure, specifically the advanced organizer, to be significant in the online class. He found that the advance organizer promoted more meaningful learning and facilitated the transfer and assimilation of information. The advance organizer was found to set up the students’ internal schema, which was then used to organize learning.

Regardless of the discrepancies in the literature, we remain confident that in the right context, an advance organizer can provide cognitive structure and readiness for material. This leads into the development and use of the subject sampler.

The subject sampler

The theory and research underlying both the information processing system and the advance organizers are helpful in beginning to understand the best way to develop and incorporate the subject sampler into an online course.

Used as an overture for a course, the subject sampler can serve as an advance organizer for course content. A well-designed subject sampler will gain the attention of benighted students and entice them to dig a little deeper. And, unlike the stale and one-dimensional webs of the past, the subject sampler is interactive and multidimensional, providing students with the choicest morsels of sound, language, and images.

By asking students about their perspectives on the topic, comparisons of their experiences, and interpretations of data, the sampler activates prior knowledge that students need in order to appropriately encode the material into existing knowledge

structures, an important feature of IPT. Also, by generalizing the content of various units of the course, subject samplers can provide an anchor for which all course content can relate to one main point. Often this is helpful with a course made of seemingly unrelated units.

These and other characteristics of the subject sampler make it an ideal medium for meeting seven of Huitt's (2000) nine suggestions for incorporating the Information Processing Theory into a class: gain students' attention, bring to mind prior learning, point out important information, provide opportunities for students to elaborate, provide repetition for learning, and provide opportunities for over learning.

Just as Huitt's suggestions transfer to the subject sampler, Ausubel's (1960) procedure for creating effective advance organizers can be transferred to the development of the subject sampler. The eight steps include: 1. analyzing learning materials; 2. mapping the cognitive structures of learners; 3. determining characteristics of the advance organizer; 4. estimating the readability of the advance organizer; 5. checking the understandability of the advance organizer; 6. assessing the study time of the advance organizer; 7. valuing the validity of the advance organizer; 8. revising the advance organizer. If modified to fit the subject sampler and its online context, which includes the addition of hypertext, graphics, and large documents that need to be navigated, these eight steps can greatly guide a teacher into appropriate methods to create a subject sampler which can be successfully used to promote learning and retention.

Conclusion

The use of the World Wide Web for promoting learning provides great potential for both students and faculty. The WWW enables students to have more control over

their learning process through customization and synthesis of ancillary knowledge bases. The need to understand how the Internet and World Wide Web sites can best supplement our online classroom activities is of growing importance as the demand for online courses grows. Students and teachers must learn how to effectively harness the WWW and its wealth of information in order to make online courses alive, relevant, and interesting. This presentation focuses on Subject Sample as a tool for introducing students to the content of the online course, develop ideas that enhance encoding, and building bridges between isolated content. The Subject Sampler takes advantage of the interactive opportunities provided by the World Wide Web while incorporating elements that support the information processing theory.

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