Object Oriented Learning and Testing

Kim S. Uhlik, Ph.D.
Assistant Professor, School of Exercise, Leisure, and Sport
Kent State University, Kent, Ohio

Introduction

Educators recognize that presenting information in a variety of formats enhances learning and can reinforce the underlying connections that invariably link facts and concepts together to form a framework of knowledge (Alexitich, 2002; Duller, Creamer & Creamer, 1997; Dunn & Griggs, 1995; Entwistle, 2001; Guild & Garger, 1998; Hemwall & Trachte, 1999; Lukow & Ross, 2003; McCarthy, 2000, Uhlik, 2004).

Object Oriented Learning and Testing draws on learning style theory and principles of associative psychology to simultaneously activate and engage identified learning style components by using familiar, content-related objects to stimulate the creation of an explicit network of intertwined knowledge about a topic. As Confucius said, "I hear and I forget; I see and I remember; I do and I understand" (Cambridge, 1900).

A brief summary of learning style

Learning style can be described as "the way in which each person begins to concentrate on, process, and retain new and difficult information" (Dunn & Griggs, 1995, p. 14), which, in turn, "governs how we think, make judgments, and form values about experiences" (Guild & Garger, 1998, p. 23). Although the definitive learning style *scheme* (e.g., Dunn & Dunn, 1993; Entwistle, 2001; Fleming & Mills, 1992; Kolb, 1984; Long, 1992; McCarthy, 1996; Szucs, Hawdon & McGuire, 2001; also Gardner, 1983, 1993, 1999) has yet to be agreed upon, the existence of individual preferences or tendencies involving the acquisition and processing of information is generally accepted. Researchers have concluded that:

1. Most individuals can learn.

2. Instructional environments, resources, and approaches respond to diversified learning style strengths.

3. Everyone has strengths, but different people have different strengths.

4. Individual instructional preferences exist and can be measured.

5. Given responsive environments, resources, and approaches, students attain statistically higher achievement and attitude test scores in matched, rather than mismatched treatments.

6. Most teachers can learn to use learning styles as a cornerstone of their instruction (Dunn & Dunn 1993, p. 6).

Results from administering the Learning Type Measure instrument among 1513 educators (adults) indicated that 21.9% were experiential/concrete/feeling, 32.5% favored analytical/reflective/seeing, 18.6% exhibited cognitive/abstract/thinking, and 27.1% were kinesthetic/active/doing (McCarthy, M., personal communication, March 14, 2002). College-aged respondents taking the Learning Styles Inventory were more equally distributed (O'Shea, M., personal communication, August 31, 2000), but a one-way ANOVA mean sums statistics reported in Szucs, Hawdon and McGuire's (2001) study involving leisure science students showed a collective tendency toward exhibiting the "doing" learning style – followed by the "seeing" style – with fewest displaying the "feeling" learning style. Two more recent analyses of leisure and recreation students' learning styles (Lukow & Ross, 2003; Uhlik, 2004) both supported the doing and seeing distribution reported by Szucs, Hawdon and McGuire (2001).

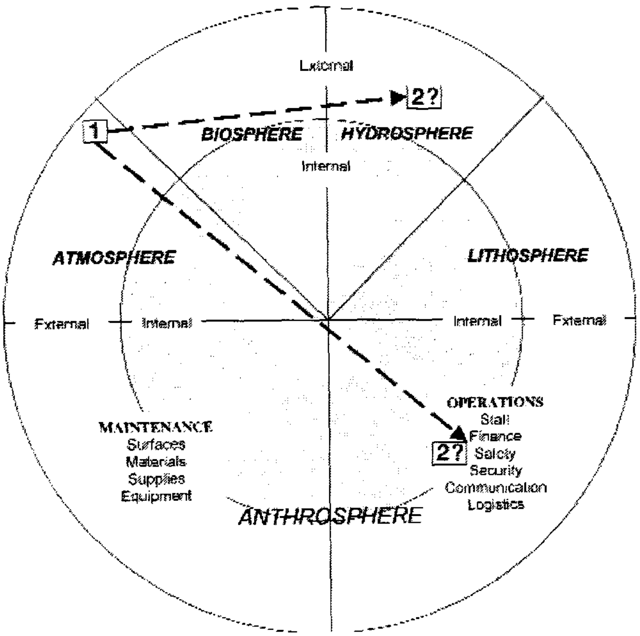
The Object Oriented Learning and Testing model

As a model, object oriented learning and testing is based on – in addition to learning style theory – principles of associative psychology such as visual cognition in memory, neural networks, and the "geography" of thought (e.g. Volpe, 2003). Psychological research and common experience have confirmed that the senses often interact and reinforce one another when memories are formed. (A Google® search using the keywords *senses memory psychology* retrieved in excess of two-hundred thousand items.) Stimulating one of the senses associated with a given memory frequently triggers vivid remembrance of the entire experience.

Conceptually, the model incorporates general elements of threaded discussion (e.g. Barcelona, 2004) and visual diagramming (e.g. Nisbett, 2004). Although it is not a "game" *per se*, it provides some of the benefits derived from game-like activities (e.g. Honeycutt, 2004). The instructor is required to translate or transform previously presented course information and concepts into an image, a conceptual "map" or diagram, delimiting a given academic course's principle content according to a classification method devised by the instructor. Figure 1 depicts one content specific representation of the model. Next, the instructor reveals a physical object to the students, displaying it so that all may observe, or even touch the object if appropriate. Finally, a location on the map is chosen as a starting point, and a sequence of numbered points connected by lines are drawn on the map, complimented by identically numbered explanations written in spaces below the map.

The model in practice

In the present case, the approach taken with a *Maintenance and Operation of Facilities and Areas* course was to classify each informational or conceptual component into one of five "spheres:" the atmosphere, biosphere, hydrosphere, and lithosphere comprising the natural world, and the "anthrosphere" (human environment) encompassing both maintenance and operations concerns. All five spheres can have an internal or external manifestation depending on the particular circumstance (See Figure 1).



1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________
6. ______________________________
7. ______________________________
8. ______________________________
9. ______________________________
10. ______________________________

Figure 1

The "object" provided by the instructor was a golf ball, which was shown to all the students, and then given to one of them to hold and examine. That student was asked to relate the golf ball to one of the areas on Figure 1, and did so by imagining the ball flying through the air after being struck. The mention of "air" indicated the *atmosphere (external,* as the golf course is an outdoor area), so the number "1" was placed on Figure 1 within the region labeled "external atmosphere." On Line 1 below the diagram, a definition of "atmosphere" was written. Then, the ball was passed to another student, who had myriad choices. For example, s/he could draw a line from Number 1 to the *operations* region of Figure 1, opposite *safety,* writing a number "2" at that location. In the similarly identified space below the diagram, s/he would write about how a member of the staff should monitor the weather radar to determine if bad weather and lightening (atmospheric manifestations) was imminent. As it turned out, in this instance, that next student imagined the ball landing in the woods, which resulted in a line being drawn from the Number 1 to the Number 2, located in the *external biosphere* region of Figure 1.

The above procedure is repeated until a preset total of numbers, lines, and explanations are recorded. In the present case, the entire class was involved with the exercise, which was used as a test review, but the model could just as easily be employed for testing individual students, limiting the links to a maximum of ten, for example. The diagram acts as a visual guide and framework (seeing learning style), the numbering, and drawing links, demonstrate students' logic intellectually and kinesthetically (thinking and doing), and the explanations measure the completeness of their knowledge (thinking and feeling). All the while, the object and map interact to stimulate the cognitive and literal content connections.

Student comments about the object oriented approach

When first implemented, students were told that this exercise was experimental – more like a group initiative then an actual test – and that their written critiques would be welcomed. Their responses were quite insightful and illuminated their analytical abilities, own learning style awareness, and an appreciation of the effort to accommodate those styles with alternative learning/testing methods. The great majority recognized the model's ultimate pedagogical purpose, and most judged it to be successful. To paraphrase their comments, "The overall diagram was easy to read [visual and organized] in this format, and helped me better understand the spheres;" "Being able to see and hear helps both the visual and audio learning [styles];" "It is an effective way to apply concepts from class to real world occurrences or examples;" "Once you start writing, then it will be hard to run out of ideas;" "Following an item and making connections is a great way to encourage independent thinking;" "It definitely works for the kinesthetic learner, it helps to draw it as well as describe it;" and, "I think it is a good judge of what we know."

Among their concerns were (a) students may be able to "wing" their way through this type of test, so the instructor may have to impose some preconditions (e.g. requiring that a number be placed at least once within every major category), (b) the displayed object must be familiar to all students (or let each student choose her/his own), (c) students should be provided with ample opportunity to work with the diagram prior to testing (introducing it early in the semester, followed by regular practice), and (d) some subject areas (one student mentioned "chemistry" as an example) might not lend themselves as easily to being mapped/diagrammed.

Conclusion

Most of us have experienced a lucid memory being evoked by a later sensory stimulus. Taking advantage of this common and proven association can enhance student learning, add vibrancy and innovation to the classroom environment, and accommodate students' diverse learning styles: particularly the doing and seeing styles often exhibit by leisure studies students.

Given that "One of the most significant challenges that university [faculty] face is to be tolerant and perceptive enough to recognize learning differences among their students" (Anderson and Adams, 1992, p. 19), Object Oriented Learning and Testing may provide instructors with a viable alternative.

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