Examining Bloom's Taxonomy and Peschl's Modes of Knowing for Classification of Learning Objects on the PBS.org/teachersource Website.

John DiMarco

KEYWORDS
Classification, learning objects, PBS.org, taxonomy, Bloom's Taxonomy, learning objectives, cognitive domain, Peschl's modes of knowing.

ABSTRACT
The delivery of learning objects, small chunks of stand alone core components of reusable instruction (Nugent 2005) are used extensively in k-12 environments. Learning objects are videos and animated clips which are deployed in classrooms through public television companion websites. One such site is PBS.org/teachersource. The educational content website is populated with learning objects classified by state standards and grade levels. The PBS.org/teachersource website provides a rich media portal of learning objects on the internet that integrates interactivity and games to provide an enhanced learning experience for students ranging from pre-k through 12th grade. Scholars and institutional reports (Schaffer & Douglas 2004, Nugent 2005, and PBS 2003) have identified challenges with learning objects lacking reliable pedagogical and curricular context due to the need for interpretation of raw materials by teachers and students (Nugent 2005). Technical challenges in learning objects include pedagogy and context relationships, issues with metadata in digital portals, and digital rights to content. Each technical challenge presents opportunity for further research.

This is a study of metadata representations of learning objects. The goal of this study was to propose and apply a comparative taxonomy to classify learning objects based on Bloom's Taxonomy and Peschl's modes of knowing, thus adding to the discourse on taxonomies present in learning object repositories and knowledge-oriented educational processes existing in public broadcasting and educational new media content domains. I examined learning object metadata in search descriptions for outcome-illustrating verbs and keywords that match those put forth by Bloom (1956), Krathwol (2002), Krumme (2005), and modes of knowing keywords put forth by Peschl (2006).

Methodology and data gathering included qualitative content analysis and taxonomy development for the PBSkids.org/teachersource website learning object population in December 2006 and then a year later in December 2007. Conclusions from data collection in 2006 included finding that learning objects at PBS.org/teachersource are instructionally designed on achieving objectives that are lower in the cognitive domain based on the research of Bloom and his editorial group and the subsequent instantiations of the 1956 work in 2002 by Krathwol and in 2005 by Krumme.

CHART: Nominal data representation chart for categorization of occurrences of objectives-based outcome verbs in search retrieval descriptions at PBS.org/teachersource. This chart highlights the problem with the classification structure used at PBS.org/teachersource for categorizing multimedia learning materials (learning objects). The current PBS website categorization structure uses grade level. Based on this study, I propose using Bloom's taxonomy, which uses higher and lower level cognitive domain value as a condition for inclusion. By examining keywords used in Blooms Taxonomy and matching them to keywords found in search descriptions at PBS.org/teachersource, I was able to conclude that higher level cognitive educational objectives had a lower percentage of outcomes, thus illustrating that the learning materials (learning objects) did not focus on higher level learning objectives. Teachers can use this explicit learning objective information when utilizing these materials for their lessons.

Bloom's Taxonomy of Educational Objectives in the Cognitive Domain 1=lowest level	Total occurrences for all objectives individually (616)	Rank of Occurrences	% of occurrences of keywords and outcome illustrating verbs found in retrieved Learning Object Descriptions from PBS.org/teacher source
1. Knowledge (A)	167	First	27.11%
2. Comprehension (B)	79	Fourth	12.82%
3. Application (C)	127	Second	20.61%
4. Analysis (D)	101	Third	16.39%
5. Synthesis (E)	74	Fifth	12.01%
6. Evaluation (F)	68	Sixth	11.03%
TOTALS:	n=616		

To update and test the research, a year later in December 2007, the methodology will be reemployed to determine whether the level of learning objective has increased or decreased. The methodology has been extended to compare the modes of knowing and knowledge put forth by Peschl (2006) to PBS learning object descriptions. This study will be used to further examine and interpret whether PBS learning object content can be seriously considered as providing enrichment of higher level educational objectives and knowledge creation according to taxonomies put forth by Bloom (1956), Krumme (2005), and Krathwol (2002), and Peschl (2006).

Currently, PBS.org uses a standards based taxonomy for search retrieval of learning objects. This means that items are categorized by subject and grade level. The problem with this classification structure is that it does not provide a contextual based taxonomy that is focused on learning objectives for retrieving learning objects. Using the current flat, standards based taxonomy may impede retrieval success for teachers due to a lack of objectives-based context. Utilizing Bloom's familiar taxonomy and contextual lens, the information seeking activities of teachers looking for meaningful learning objects can go beyond baseline grade level headings or subject headings. Placing

learning objects in a familiar objectives-based, contextual framework such as Bloom's Taxonomy might help teachers accelerate success in transferring learning objectives using learning objects.

REFERENCES

Bloom B. S. Engelhart M, Furst E, Hill W, and Krathwohl D. R., 1956. Taxonomy of Educational Objectives: The Classification of Educational Goals, by a committee of college and university examiners. Handbook I: Cognitive Domain. New York: Longmans, Green.

Douglas, I., and Schaffer, S. 2004. Integrating Knowledge, Performance, and Learning Objects. The Quarterly Review of Distance Education, 5 (1): 11-19.

Krathwohl, D. R., 2002 A Revision of Bloom's Taxonomy: An Overview. Theory into Practice, 41 (4): 212-218.

Krumme, G. 2005. "Major Categories in the Taxonomy of Educational Objectives (Bloom 1956)," University of Washington, http://faculty.washington.edu/krumme/guides/bloom1.html

Nugent, G. 2005. Use and Delivery of Learning Objects in K-1: The Public Television Experience. TechTrends 49(4): 61-65.

Peschl, G. 2006. Knowledge-Oriented Educational processes from Knowledge Transfer to collective knowledge Creation and Innovation. ISKO Proceedings of the Ninth International ISKO Conference (10): 59-69.