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Applying Mastery Learning to Athletic Training Education

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Objective: Historical and current athletic training education literature rarely references any educational theory or instructional model. This article reviews research related to mastery learning and athletic training educational history. It focuses on the possibility that mastery learning was the implicit foundational instructional model of athletic training education and evaluates its correlation with current athletic training educational programs (ATEPs). This review illustrates the need to identify the historical and current educational theory or instructional model for athletic training education.

Sources: Studies reviewed include published articles, books, and dissertations involving mastery learning and the history of athletic training education.

Conclusions: Evidence suggests that mastery learning and the outcomes movement set a strong foundation for athletic training education. Athletic training education has evolved, and the correlation between mastery learning and current athletic training education is less strong. The field of athletic training education should not exist in a vacuum, yet our publications make little mention of our wider educational roots. A clear view of historical educational foundations and current practice will enhance planned systemic and local program reform.

Keywords: competency-based education, Bloom's Taxonomy, outcomes, critical thinking, programmed instruction, skills-based curricula, outcomes-based education

Athletic training education literature shows no clear historical link to any specific educational theory or instructional model. Other than the apprenticeship, or medical school curriculum model, the literature makes few references to any specific educational theory or instructional model on which athletic training education is, or was, founded. Harrelson[1] states:

> without some theory or model to provide a structure for learning, and into which instructional strategies can be "plugged", learning in the clinical setting may well be left to chance….without some framework for clinical instruction, learning occurs haphazardly, and we may well continue to perpetuate a clinical experience instead of a clinical education.

It is important to athletic training education to determine if there was an initial pedagogical theory or instructional model as the basis for current practices. This article focuses on the possibility that mastery learning was the implicit foundational instructional model of athletic training education and evaluates its correlation with current athletic training educational programs (ATEPs).

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What is Mastery Learning?

Mastery learning is an instructional strategy that breaks down educational content into smaller units according to the essential components of a particular subject matter. These smaller content areas establish learning objectives, which then guide the instructional process. Following instruction, students are tested and expected to perform at a pre-determined level, generally 80%.[2] Students who meet the performance criteria advance to the next objective. Students who do not meet the performance criteria repeat the unit until demonstrating satisfactory performance. Mastery learning, in its various forms, may also be referred to as programmed instruction[3], competency-based education[4], skills-based curricula, or outcomes-based education.[2] In fact, there is great confusion in the education literature as to the meaning and use of some of these [3, 4]

Mastery learning programs are based on the premise that, given the correct instruction and time to learn the material, all students can achieve the desired objectives at a satisfactory level.[2,5] Proponents of mastery learning believe that the limiting factor in other instructional models is not the lack of student ability but the lack of proper instruction or time with the material. Mastery learning is a teacher-centered approach; the teacher determines the objectives for learning, provides the lesson and directs the pace of instruction.[5] Mastery learning is generally accepted as an appropriate teaching model for skills-based subjects that have easily quantifiable content.[2]

Though mastery learning is often thought of as a development

of the 1950s objectives movement, there is evidence that some educators used the basic principles of mastery learning as early as the 1920s.[5] Mastery learning is one of the most frequently used models of instruction and is most commonly associated with primary grade level reading, mathematics, exceptional learners and military training. The vast majority of research conducted in the area of mastery learning reports positive findings.[2]

Foundations of Mastery Learning

The work of Ralph Tyler, Benjamin Bloom, and John Carroll heavily influenced the mastery learning model. Their works, published from 1949 through 1964, were the basis behind the objectives movement. Ralph Tyler provided part of the foundation for the objectives movement. His book, *Basic Principles of Curriculum and Instruction*, provided a framework for educators to plan curriculum and instruction. The "Tyler rationale" proposed the idea that the first step in planning a curriculum is to determine appropriate objectives.[6]

Benjamin Bloom later based his three categories of objectives–cognitive, affective and psychomotor–on Tyler's work.[2] Cognitive pertains to recall and recollection of information, and intellectual skills. Affective pertains to interests, attitudes and values. Psychomotor involves manipulatives and motor skills.[7] Bloom's books *Taxonomy of Educational Objectives, Handbook I: Cognitive Domain* [7] and *Taxonomy of Educational Objectives, Handbook II*: *Affective Domain*[8] attempted to provide educators, researchers and curriculum planners with a common language. Bloom felt there were too many misconceptions in the field of education due to a lack of a common communication base.

Handbook I classifies cognitive information into six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.[7] *Handbook II* classifies the affective domain into five parts: receiving (attending), responding, valuing, organization, and characterization by a value or a value complex. [8] Bloom and his colleagues wrote both of these books with the intent of presenting their classification system for use by educators of all philosophies and epistemologies. In addition, they presented *Handbook I* without making value judgments between levels of cognitive information.[7] They contend that it is possible for learners of all ages to perform at all six of the cognitive levels, but students achieve mastery of the information when they work at the most complex cognitive and affective levels, evaluation and characterization.[2]

John Carroll's influence on mastery learning was the idea that student aptitude determined only the time it would take to learn the stated objectives, not his or her ability to learn them.[2] In a mastery learning environment, students who do not receive a satisfactory score on their objectives assessment repeat the learning module. Through this repetition, students gain more time exposure to the material, and the process repeats itself until all of the objectives are met. Therefore, every student who completes the mastery learning program achieves a minimum competence with the material.

Advocates of mastery learning and the objectives movement, sought to correct what was perceived to be wrong with the education system by creating a "teacher proof curriculum." Proponents of the objectives movement felt that properly established curriculums would use sound strategies to develop objectives, which all teachers would use to formally and identically present the material. Therefore, all students under a properly developed and administered mastery learning system would receive the proper material and master the objectives with a standard amount of competence.[2]

Evolution of Athletic Training Education Programs

The modern-day profession of athletic training began in the 1950s; however, educational programs were not established until the late 1960s and 1970s. Following the founding of the National Athletic Trainers' Association (NATA) in 1950, athletic training education was seen as a major component to enhancing the reputation of the profession as a whole. In 1959, the Committee on Gaining Recognition announced the first curricular recommendations for an athletic training education program . There are several important features of this original curriculum. First, there was an emphasis on gaining a secondary-level teaching credential in order to increase the marketability of athletic trainers. Second, there was an emphasis on obtaining physical therapy school pre-requisites. Third, the curriculum model was mainly comprised of courses already in existence and easily found in many physical education programs. It was not until 1969, however, that the NATA began to recognize curriculum programs.[9, 10]

During the 1970s, revised curriculum program course requirements removed the emphasis on physical therapy pre-requisites and secondary-level teaching credentials. The new athletic training curriculum course requirements included only those courses deemed specific to the profession of athletic training. In addition, the revised curriculum specified 600 clock hours with an NATA-certified athletic trainer.[10] These new course requirements were implemented for NATA-approved curriculum programs, however, the primary form of learning for most athletic trainers continued to be the apprenticeship approach, or medical school model. [9]

The 1970s was a time when the profession began to flourish, both organizationally and educationally. There were four programs in 1969, which grew to sixty-two by 1982.[10] The first certification examination was given in 1970. Also in the 1970s, the NATA Professional Education Committee defined behavioral objectives and learning outcomes based on the recommended body of course work. In addition, they developed a competency checklist for clinical skills.[9, 10] While these behavioral objectives served as the first curriculum model and framework for the 1983 *Competencies in Athletic Training*, they did not represent a formal competency-based approach as the objectives were "dictated and restricted by the existing content of required courses."[10 (p56)]

During the 1980s athletic training curriculum programs became comprehensive academic majors using guidelines provided by the

Professional Education Committee. In addition, the largest effort to promote competency-based programs came in 1983 with the introduction of specific subject matter requirements (versus course requirements) and the *Competencies in Athletic Training.* These competencies were based on the newly completed role delineation study, which was conducted by the NATA Board of Certification.[10]

In 1990, the Joint Review Committee on Educational Programs in Athletic Training, or JRC-AT, began to organize. Its mission was to develop the standards and guidelines for accreditation. These standards and guidelines included the 1983 *Competencies in Athletic Training*, and in 1994, the first two ATEPs were accredited by the Committee on Allied Health Education and Accreditation (CAHEA). In 2004, the internship route to certification was discontinued.[10]

Mastery Learning as a Model for Athletic Training Education

Despite the lack of formal references in athletic training education to educational theories or instructional models, there are some inferences that can be made by looking at the educational climate of the time. During the 1950s and 1960s, and fueled by Bloom's taxonomies of educational objectives, the educational climate emphasized objectives-based teaching.[2] The establishment of behavioral objectives and learning outcomes for athletic trainers in the 1970s closely parallels the outcomes movement, which was widespread in the public school system.

Inferences regarding the educational foundations of athletic training education can also be made through the many references to Bloom's *Taxonomy* in athletic training documents and research.[11-14] Starkey [15(p. 114)], former Chair of the NATA Education Council, did not reference Bloom directly but stated that the "clinical education model should be based on a set of measurable, standardized, and referenced learning objectives." The statement is a clear link to objectives-based education, yet in a 268 page *Journal of Athletic Training* supplement on athletic training education; no author makes any clear historical link to anything other than the medical school apprenticeship model and Bloom's *Taxonomy.* Only two articles reference current athletic training education as competency-based education.[9, 16] Weidner and Henning[9] stated that the "incorporation of the subject matter requirements and athletic training competencies into the 1983 guidelines represented an effort to promote the development of true competency-based athletic training education programs." *The Athletic Training Educational Competencies: 4th Edition* makes direct reference to Bloom's *Taxonomy*; however, it does not reference any specific instructional model or educational history.[13]

Bloom's *Taxonomy* was not intended to be used as an educational philosophy, teaching method or curriculum development model. It was simply intended as a "method of classifying educational objectives, educational experiences, learning processes and evaluation of questions and problems."[17] Therefore, Bloom's taxonomy should not be called a model for athletic training education; yet it remains the most frequently cited curriculum material and seems, in practice, to be used as a model by many in education.

While athletic training publications do not state that mastery learning is the instructional model used for athletic training education, there appear to be many similarities between the two. The 3rd Edition of the *Athletic Training Educational Competencies* contains the thirteen content areas outlined by the Role Delineation Study as essential to an entry-level athletic trainer. These content areas are then split into cognitive, affective and psychomotor behaviors.[18] These are the very behaviors outlined by Tyler [6] in *Basic Principles of Curriculum and Instruction*. These behaviors, along with classifications delineated by Bloom, provide most of the foundation for the mastery learning model.

B.F. Skinner, a behaviorist and proponent of the mastery learning model, thought that if "teachers would only stick with the program as outlined by the curriculum experts, then all the ills of education would be fixed."[2(p. 155)]. However, even following the early attempts to create this curriculum outline, there was still too much independence and diversity in athletic training education due to lack of regulation. In 1997, an initiative passed eliminating the internship route to certification and establishing that, beginning in 2004, all entry-level athletic trainers must graduate from an accredited program. This was a dramatic step and major departure from the historical foundation of the profession. Within each of the accredited programs, a standardized curriculum was offered and the *Competencies in Athletic Training* was used as the framework for didactic and clinical education.[9] The hope was that these steps would lead to more uniformity among entry-level certified athletic trainers. While the phrase "teacher proof" is extreme in the case of athletic training education, most major educational reforms concentrated on creating a uniform set of objectives for all programs and mandating programs teach and assess students on these objectives.

Though the use of a student clinical education matrix as a means to evaluate completion of outcomes is not mandated by the Commission on Accreditation of Athletic Training Education (CAATE), many programs choose to use one as a part of the clinical education component. In general, a student clinical education matrix is a list of items identifying what a student must complete following the instruction and evaluation from an approved clinical instructor (ACI). This matrix consists of items from the *Athletic Training Educational Competencies,* which students must complete in a specified amount of time (ex. semester).

Following the parameters of modified mastery learning, a student clinical education matrix determines the objectives for learning, while the teacher (ACI, CI and/or instructor) provides the lesson and pace of instruction.[5] The use of a student matrix to provide a foundation for clinical instruction follows many of the tenets of mastery learning. First, a student matrix allows independent progression through the material (within the confines of the course). Second, a matrix provides formative and summative

evaluation of student learning outcomes. Third, a matrix is teacher-centered. Finally, the use of the *Athletic Training Educational Competencies* and a student clinical education matrix marks a departure from "counting hours" through the medical school internship model. This places the emphasis on quality of education, not quantity of hours. Students must master the material, not simply be exposed to it.

Historical Model vs. Current Practice

If one determines that mastery learning is in fact the historical model for athletic training education, one must evaluate whether the profession continues to use the model appropriately. As Dunkle[3] explains, true mastery learning education allows unlimited time for the learner to progress through the objectives. As accredited athletic training education programs work within the confines of the academic calendar, one must assume that they are modified mastery learning programs. This may explain why there are a handful of references in athletic training literature to competency-based education, which is slightly different but comparable terminology to modified mastery learning.

Mastery learning, modified mastery learning, and competency-based education models each dictate that all students receive the same information, in the same manner, and following the same evaluation process. Athletic training education programs do not follow these rules. Neither the *Standards* nor the *Competency and Proficiency Matrix* dictate the order or manner in which information is presented in the classroom. The use of a student matrix in the clinical setting merely provides objectives that must be met. It does not provide any indication on how to present the material, the order for presenting the material, or how to evaluate the learning. Many athletic training programs see the lack of restrictions on ACI instruction as a benefit because it allows for a variety of instruction and an inclusion of different perspectives. While it may or may not be beneficial to include these varied perspectives, the practice does not follow the intent of mastery learning or its related models.

Application to Current Educational Practice

Athletic training program directors are wise to understand basic curriculum theory and instructional models. Many of these models have been evaluated extensively in the wider education literature. If the goal of athletic training educators is to increase student learning, one must assume that educators should use the best instructional methods possible. Athletic training educators should turn to the existing education research and investigate which methods are most useful in our classrooms and clinical experiences. This research shows that mastery learning is appropriate for easily quantifiable content and has positive outcomes for subjects like math and military training.[2] In addition; mastery learning shows benefits for criterion- and norm-referenced tests. There is no evidence to suggest that mastery learning models will be of benefit to those who desire broader outcomes, such as critical thinking.

Recently much attention has been paid to the development of critical thinking skills in college students. Program directors should investigate whether their use of a student clinical education matrix is appropriate, and whether the manner in which it is used can be modified to instill the critical thinking skills that are lacking with a strict mastery learning format. The 4th Edition of the *Athletic Training Educational Competencies*[13(p. 2)] states:

> as students become competent with this level of knowledge and skill, program personnel are encouraged to challenge students to demonstrate the cognitive and psychomotor competencies at the analysis level of Bloom's taxonomy. The Clinical Proficiencies integration of decision-making and critical thinking provides students with the additional means to demonstrate knowledge and skill at the analysis level of Bloom's taxonomy.

The recent addition of the Clinical Proficiencies and the emphasis on critical thinking skills represents a clear departure from the skills-based knowledge and lower order taxonomy classifications used in the past. This difference should be reflected in the education of instructors and ACIs as they carry out student education and evaluation using a student clinical education matrix. If instruction and assessment of the new Clinical Proficiencies is carried out in a lower-level standardized and teacher-centered manner, critical thinking skills may not be realized

Conclusion

Evidence suggests that the outcomes movement set a strong foundation for athletic training education. The correlations between mastery learning and athletic training education are strong in historical practice but less strong when analyzing current practices. It is not the intent of the author to discourage or champion the cause of mastery learning as a teaching method. However, understanding any teaching methods strengths and weaknesses is critical to improving learning outcomes. Furthermore, the importance of determining the direction from which the profession came from, and the direction in which it is heading, should not be ignored.

CAATE *Standards and Guidelines* and Education Council recommendations are directly responsible for much of curricular practices within ATEPs. As a developing profession, it is practical to speculate on the theoretical and pedagogical foundations from which the recommendations and standards were born. If those foundational theories and pedagogies match what we desire as professional educators today, their instructional models should be researched and ATEP faculty should be made aware of the evidence supporting those models. If those foundational theories and pedagogies do not match what we desire as professional educators, research into other educational theories and models is needed. The field of athletic training education should not exist in a vacuum, yet our publications make little mention of our wider educational roots. Planned systemic reform and local program reform can be enhanced by a clear view of the historical educational foundations and clear explanation of current practice.

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