

Using AMLO to Improve the Quality of Teacher Education Outcomes

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This study aims to find ways to improve learning outcomes in teacher education courses by using an Analysis Model for Learning Outcomes (AMLO). It addresses the improvement of the quality of teacher education by analyzing learning outcomes and implementing curriculum modifications related to specific learning objectives and their effects on student learning and achievement. The learning outcome data of two groups of female students enrolled in an education course were analyzed for comparison. The results indicated significant improvements in learning outcomes for the second group after curriculum modifications were implemented. These results highlight the importance of analyzing learning outcomes for quality improvement in teacher education. This paper discusses some of the benefits of using AMLO in teacher education and other disciplines, and provides recommendations for faculty members, administrations, and researchers.

Introduction

Learning outcomes are contemporary indicators of quality in the field of education. They are defined as documented results measured by different assessment techniques that indicate the student achievement of learning objectives in a course of study (James, 2005). Nowadays, there is a gap in researchers' understanding of how learning outcomes should be improved (James & Brown, 2005). Some research (e.g., James, 2005) has sought to find ways to improve learning outcomes; nonetheless, university instructors are occasionally clueless about where these outcomes specifically came from, in terms of where or why certain questions were raised or missed during the teaching and learning processes (Wright, 2010). Specifically, Carey and Gregory (2003) stated that a

“systematic outcomes assessment for improving student learning is less frequently seen in higher education” (p. 223).

The analysis of assessment-based learning outcomes requires the measurement of specific variables such as student achievement and the achievement of learning objectives in any course of study (Al-Shammari, 2010). Measurement and evaluation procedures related to student performance directly affect student achievement (Wesson, Deno, Mirkin, Maruyama, Skiba, King, & Sevcik, 2001). Thus, measuring student achievement and analyzing learning outcomes helps to improve the quality of teacher education programs (Gordon & Debus, 2002). In addition, the assessment of learning outcomes helps instructors implement specific course improvements (Carey & Gregory, 2003).

The purposes of the present study are threefold. First, this study presents the learning outcomes found by a newly developed Analysis Model for Learning Outcomes (AMLO), which indicates the achievement percentages of learning objectives in a teacher education course and links the course requirements to the course learning objectives, thereby facilitating curriculum modifications. Second, the study uncovers the necessary curriculum modifications related to specific learning objectives that should be implemented in the curriculum materials in this teacher education course. Finally, the study provides some guidelines for future research that can apply AMLO to the analysis of learning outcomes and improve the quality of teacher education programs.

Assessment and Outcomes: Some Background

Assessment is a meaningful and ongoing process that focuses on improving and enhancing student learning (Wright, 2010; McGregor, 2002; Boyce, 2008). Bers (2008) defined assessment as a tool that determines whether students learn what they are expected to learn, while McGregor (2002) stated that using assessment processes benefits both students

and faculty. Other research (Al-Shammari & Yawkey, 2007) has revealed that assessing the outcome of what has been taught helps to improve student learning and enhance the quality of education.

Previous research (e.g., Elfner, 1979) assumed that the most effective means by which student outcomes should be analyzed was the input-output technique. Currently, there is a new shift in teacher education, especially in the U.S., toward a focus on outcomes (Cochran-Smith, 2008). Jarchow and Wooldridge (2004) indicated that outcomes-based teacher education produces high-quality teachers. However, mere assessment is not enough when documenting learning outcomes for the purpose of quality improvement in teacher education. Wright (2010) recommended using other measures of assessment that deal with case analyses of course outcomes. Thus, assessment conducted on the basis of an analysis of learning outcomes provides significant reports on all modifications that a curriculum requires in order to improve learning outcomes and quality of education. Likewise, learning outcomes as data that reports achievement demonstrating a student's successful completion of a course are important for quality assurance in education (James, 2005). Learning outcomes should be of use when analyzing both the individual and overall achievement of stated learning objectives in teacher education, as it is important to determine how those outcomes are significant within a course of study (Al-Shammari, 2010).

Modifications in the curriculum based on the analysis of assessment results are necessary for improving learning outcomes and quality of education. Wesson et al. (2001) mentioned that gathering data based on measurement and evaluation procedures helps in program changes, specifically noting that accurate changes to the structure of instruction increases student achievement. McGregor (2002) indicated that a positive change in designing the curriculum and

requirements of a given course revealed enhanced student learning and outcomes. In addition, Chapman and Bloxham (2004) indicated that providing students with necessary assessment tools can improve achievement in higher education through explaining and understanding expectations, indicating where changes need to be made to improve achievement.

Method

AMLO Development and Application

AMLO is a web application tool that analyzes and extracts learning outcomes based on course requirements, learning objectives, and students' achievements in the course of study. It was initially developed by the researcher for analyzing learning outcomes in education courses. Using AMLO provides statistics regarding individual and overall learning outcomes that indicate those outcomes' strengths and weaknesses, which helps in making the curriculum modifications that are necessary for course improvements in future instructional practices.

The three main components and procedures involved in AMLO are: (1) learning objectives, which state what students are supposed to be able to achieve by fulfilling the course requirements; (2) course requirements, which are the examinations, quizzes, assignments, projects, and presentations that students complete during a course of study; and (3) student achievement, represented by grade points or scores earned for each of the course requirements. The procedures are the steps followed by the instructor to fill in each of the applications in AMLO.

AMLO involves five systematic steps, as follows: (1) entering each learning objective individually; (2) entering each item in each of the course requirements and relating it to a specific learning objective; (3) entering data for each student's achievement individually regarding each of the course

requirements; (4) linking each student's achievement to individual learning objectives that determine the point(s) value for each item in each course requirement; and (5) calculating the results of entered data in order to finalize and extract the learning outcomes in each education course. These steps were processed by the researcher by relating all individual students' achievements to the course requirements and learning objectives for each education course selected in the analysis process. This required all of the data gathered during the course of study. Data was organized in ongoing procedures during the classroom learning activities that students completed in each education course.

Samples

An introductory-level education course at a university in Kuwait was selected for examining the effects of AMLO on improving the quality of learning outcomes. This education course is the first of 16 sequential education courses required in the teacher education program, which students are required to study in their third academic year. The teacher education program has four levels of education courses; each level includes four courses. Each course has specific learning objectives designed and followed by the teacher education program. The selected course contained thirteen learning objectives and included ten course requirements, as shown in Tables 1 and 2. The course is offered twice a year, in the fall and spring semesters, on a yearly basis.

In this study, the education course that was conducted in the fall semester of the academic year 2009–2010 was called Group 1 and included 21 female students, while the spring semester course was called Group 2 and included 29 female students. Sample selection was limited to female students because of the high female student enrollment rate: female students represent 93% of those enrolled in the teacher education program.

Table 1: The Thirteen Learning Objectives in the Education Course

No.	Learning Objective
1	Identify basic concepts, knowledge, and skills needed by the professional educator
2	Use effective communication techniques with all students, parents, and school administrators/staff
3	Use appropriate leadership skills in the classroom
4	Apply effective classroom management techniques with students, in class settings, and within the school building
5	Demonstrate an awareness of the characteristics of diverse students
6	Appropriately adapt instructional methods and materials to meet the needs of diverse students
7	Exhibit deep conceptual understanding
8	Effectively and actively engage in learning
9	Work collaboratively and individually in certain classroom tasks and activities
10	Use formal and informal assessments that help demonstrate understanding of materials
11	Apply problem-solving and critical thinking skills
12	Create, develop, and maintain a professional portfolio
13	Be aware of all related issues through research and field experience

Table 2: Education Course Requirements

Course Requirement	Percentage of Total Class Grade	Number of Questions	Total Possible Points
Quiz 1	2.5	5	2.5
Quiz 2	2.5	5	2.5
Quiz 3	2.5	5	2.5
Quiz 4	2.5	5	2.5
Mid-term Exam 1	30	41	30
Reading Reaction 1	2.5	2	2.5
Reading Reaction 2	2.5	2	2.5
Reading Reaction 3	2.5	2	2.5
Reading Reaction 4	2.5	2	2.5
Presentation	5	10	5
Final Exam	30	32	30

Data Used in AMLO

Data for the education course were collected during the two consecutive semesters of academic year 2009–2010. The data for the two different sections were gathered by the research assistant after the instructor completed the grading process, and were coded into AMLO anonymously. Data entered into AMLO for Group 1 and Group 2 included all students' detailed achievements for all individual course requirements related to all individual learning objectives in the selected education course. For example, data for Group 1 were entered as is without curriculum modifications, while data for Group 2 encompassed modifications implemented in curriculum materials when the course was taught in the spring semester. These modifications were made based on data from

Group 1 regarding what those students failed to accomplish during the fall semester.

Collected data were analyzed using AMLO. Data for Group 1 was analyzed to extract learning outcomes and determine when learning outcomes fell below 75%. Curriculum modifications were made to all materials related to these outcomes. These materials were then taught to Group 2 in improved ways. Data for Group 2 was analyzed by the same method used for Group 1, after which both groups' learning outcomes were compared to determine whether there had been improvements. The AMLO analysis process provided the results for learning outcomes as percentages showing to what degree the thirteen learning objectives in the education course had been achieved in both groups (see Table 3 for further information about percentages). These thirteen learning objectives are listed in Table 1.

Results

This study addressed one main research question: will learning outcomes improve when curriculum modifications based on specific learning objectives are applied to a course of study? This question was raised in order to analyze learning outcomes using AMLO and to determine the improvement percentages in learning outcomes when modifications were implemented in the course curriculum materials for Group 2, and in order to enhance the quality of the teacher education program at the chosen university. Two independent variables (Group 1 and 2) and one dependent variable (learning outcomes) were considered in the analysis of both groups in this study.

Table 3 shows the percentages of learning outcomes in Groups 1 and 2. These indicate to what extent the students in each group achieved the learning objectives for the selected education course. Specifically, the results of learning

outcomes in Group 1 varied from 65.00% to 99.31%, while the overall learning outcome was almost 76.85%—close to the mean of the students' final grades (78.19%). Curriculum modifications were made to all materials and items related to the learning outcomes of Group 1 that were below 75%, as shown in Table 3. Specifically, these modifications were related to learning objectives 1, 4, 6, and 7 in the education course that was taught to Group 2 in the spring semester.

Table 3: Learning Outcome Percentages for Groups 1 and 2

Learning Objectives	Learning Outcomes in Group 1	Learning Outcomes in Group 2
1	70.38 *	76.1
2	83.07	84.3
3	79.91	81
4	65 *	77.3
5	76.72	79.2
6	69.77 *	80.3
7	67 *	83.5
8	76	79.3
9	77.75	81.7
10	78.65	83.5
11	79	81.4
12	99.31	99.45
13	76.44	80.9
Overall	76.85	82.15

* Indicates learning outcomes below 75% that required curriculum modifications

The results of learning outcomes for Group 2 varied from 76.1% to 99.45%, as shown in Table 3. This revealed that the overall learning outcome of all 29 female students in Group 2 was almost 82.15%—close to the mean of the students' final grades (82.8%).

Comparisons of both groups' learning outcomes revealed significant results after testing data as a normal distribution using the Kolmogorov-Smirnov test ($P = .315 > .05$). The comparisons tested by t-test indicated that Group 2 had a higher mean (82.15, SD 5.71) than Group 1 (76.85, SD 8.62), as shown in Table 4. The comparison results revealed a difference of 5.30, which indicates a 7% improvement in Group 2. This improvement resulted from the modifications implemented in the curriculum materials for Group 2 during the spring semester. In addition, t-test results revealed a significant difference between the two groups. This indicated that the difference was demonstrated in Group 2 and was significant at a rate of 10% ($P = .077$).

Table 4: Descriptive Statistics and T-test Results

Groups	Learning Objectives	Mean	Std. Deviation	Std. Error Mean	Mean Difference	T-test	(P-Value)
1	13	76.85	8.72	2.39	5.30	1.849*	(.077)
2	13	82.15	5.71	1.58			

* Significant at 10%

Discussion

This research analyzed learning outcomes with AMLO after curriculum modifications were implemented in an education course. The results demonstrate improvements in the quality of teacher education outcomes due to these modifications. The analysis in this research revealed that the achievement percentages of learning objectives mainly calculated the learning outcomes achieved by all of the students in both groups. This student achievement, as supported by Cochran-Smith (2008), determined the learning outcomes of an education course in this teacher education program.

The analysis of the results for Groups 1 and 2, completed by applying AMLO and then comparing both groups' learning outcomes, revealed significant improvements in Group 2. These improvements were found after

modifications to curriculum materials were implemented in relation to specific learning objectives taught in the spring semester. The overall learning outcomes were 7% better in Group 2 than in Group 1. The changes in the four learning objectives mentioned earlier, which were re-taught in different sections of the curriculum during the semester, were made by teaching the materials in different ways and providing more time and information on each subject related to the concepts, knowledge, skills, and activities that showed conceptual understanding that met the needs of diverse students.

Conclusions and Recommendations

The current research aims to analyze and extract learning outcomes with AMLO and then modify curriculum materials accordingly. The learning outcomes of two groups of students in a teacher education course were examined in order to determine relative improvements. Some significant improvement was found in Group 2 after curriculum modifications were made. These modifications were made based on data from Group 1 regarding what those students failed to accomplish during the fall semester; thus, a modified curriculum and materials were implemented for Group 2 during the spring semester. The results revealed that the overall learning outcomes of Group 2 had a higher mean than those of Group 1. This indicated that using AMLO helped create significant changes in the curriculum materials that resulted in learning outcomes improvements. One major limitation of this research was the sample selection. The total sample selected for the study was limited to 50 female students in two course sections offered in a teacher education program. This limitation was caused by the high percentage of female student enrollment in the program. This also reflects that male students have a limited interest in teacher education programs, which impacts their choice of

profession. Another limitation was the length of the study, as it was only conducted for two semesters.

This research presents three recommendations for the use of AMLO by faculty members and administrators in higher education institutions. First, faculty members or course instructors can extract, finalize, and analyze learning outcomes with AMLO and can modify course curriculum materials accordingly. This could then lead to improvements in learning outcomes. Second, higher education institutions can use AMLO for other purposes such as monitoring, analyzing, finalizing, and improving learning outcomes in academic courses and/or programs, as well as faculty annual reports and institutional improvements or quality assurance. Finally, future research should address a selection of male students and/or a mixed-gender sample in order to determine the effects of AMLO in different types of teacher education programs and other disciplines.

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