

Long-term learning, achievement tests, and learner centered instruction

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Abstract: The purpose of this study was to examine the effectiveness of achievement tests to measure long-term learning at the higher education level in traditional versus learner-centered classrooms. Volunteer instructors who use comprehensive achievement tests as an important component of their grading system were asked to complete an instrument that measures the level of the learner-centered approach of the instructor. Their students were asked to volunteer to retake the course's final test one semester later. As expected, although a decline in performance was observed for both groups, the decline for the low learner-centered group was much sharper.

Keywords: learner centered instruction, achievement, tests, long-term learning, higher education.

I. Introduction.

How can we determine if students are learning in college? Learning is commonly defined as a relatively permanent change in behavior or mental associations due to experience (e.g., Ormrod, 1999). However, how long does this relatively permanent change last? Are examinations a good tool to measure this learning over time? Few researchers have studied the relationship between achievement tests and long-term learning. For example, Arzi, Ben Zvi and Ganiel (1985), in a study related to the effectiveness of seriated courses, indirectly studied the permanence of learning as measured by final examinations, and found that if there was no follow-up course, the level of learning that remained after one semester was minimal. If college students are learning material for a multiple-choice examination (one of the most popular forms of assessment), how long will they retain this information? Will they be able to produce the correct answers to the examination months after it was first taken?

Kohn (2000) described multiple choice examinations as being the “most damaging” testing instrument, one which limits assessment to raw data and neglects the most important features of learning, such as initiative, creativity, conceptual thinking effort, curiosity, imagination, and so on.

A. The Learner-Centered Paradigm.

The relatively short duration of learning, however, is not only related to the type of assessment used, but also to the teaching-centered learning paradigm that today dominates higher education (Huba & Freed, 2000). Would this outcome be different if a learner-centered approach was in effect in higher education classrooms around the country?

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According to Schrenko (1994):

In a learner-centered classroom, developmentally appropriate activities are designed to help students use the thinking and learning strategies they will need to succeed in both school and in life. In a learner-centered system, standards are established, and each child is expected to achieve those standards. The time required to master skills may vary, but the standards do not. (p.28).

When college professors lecture in traditional methods, students may not have an opportunity to be enriched by the material because they are unable to make connections to their own life experiences (McCombs & Whisler, 1997). In recent years, Learner-Centered teaching has become increasingly popular among elementary middle school teachers. Several studies suggest that learning-centered schools are more effective than traditional education in promoting traditional indicators of school performance such as achievement (Fasko & Grubb, 1997; Ovando & Alford, 1997; Perry, 1999; Matthews & McLaughlin, 1994) and graduation rates (Ancess, 1995), as well as other, less traditional indicators, like motivation (Daniels, Kalkman & McCombs, 2001), student self regulation (Salisbury-Glennon, Gorrell, Sanders, Boyd, & Kamen, 1999), self efficacy and self esteem (Fasko and Grubb, 1997; Ancess, 1995; Perry, 1999; Houle, 1992), creativity (Rallis, 1996; Schuh, 2001; Hamilton, 1999), and finally tolerance, diversity and multiculturalism (Rallis, 1996; Thornton & McEntee, 1995; Donohue, 2001; Sewell, DuCette & Shapiro, 1998; Udvari-Solner, Alice; Thousand, 1996; Houle, 1992). However, there seems to be a gap between these models at the elementary levels and what happens in higher education. Compared to teaching children and adolescents, when teaching adults, teachers spend less time on discipline and giving directions, provide less emotional support to students, structure instructional activities less tightly, and vary their teaching techniques more (Beder & Darkenwald, 1982; Gorham 1984, 1985). According to Beder and Darkenwald (1982), "the real issue is not whether learner-centered methods are universally applied by teachers of adults, but rather for what purposes and under what conditions such methods, and others are most appropriate and effective and in fact used by teachers" (p.153).

It appears that students would have a greater sense of knowledge at the college level when a learner-centered approach to teaching is used in the classroom. In one study, for example, Migletti and Strange (1998) observed a relationship between learner-centered teaching methods and student success in two-year colleges. However, there is not a sufficient amount of research at the higher education level to fully support this notion.

B. The Present Study.

The purpose of the study was to determine the relationship between teaching using learner-centered principles and long-term learning as measured by final examinations. It was expected that there would be a significant decline in test performance after two months of taking the original examinations. However, examination scores were expected to be higher if a learner-centered approach to teaching had been implemented in the classroom.

II. Method.

A. Participants.

Forty-two full time students from Central Connecticut State University (CCSU) volunteered to participate. All participants accumulated enough credits to establish themselves as at least second semester freshman. Volunteers received a five-dollar gift certificate for their participation.

B. Materials.

Multiple-choice final examinations used in the previous semester in 3 different courses by different instructors in entry-level psychology courses, were re-used to assess long-term achievement of students. Although the reliability and validity of multiple-choice class exams remains suspect, this types of instruments have the best ecological validity since they are the real instruments faculty routinely use to assess performance. Therefore, and consistently with action research models, we believe these type of tests to be the better indicator of real classroom learning as opposed to a controlled experimental situation.

In addition, instructors were given the Teacher Beliefs Survey (TBS) and the Teacher Classroom Practices Questionnaire (TCPQ) to assess the level of learner-centered practices in theory courses. Both the TBS and the TCPQ are standard instruments widely used in research done in the area of Learner-Centered instruction (McCombs and Whisler, 1997). The TBS is an instrument that has 35 Likert-type items and measures the level of learner-centered beliefs a particular instructor has. It has three factors: Factor 1: learner-centered beliefs about learners, learning and teaching; Factor 2: non-learner-centered beliefs about learners; and Factor 3: non-learner-centered beliefs about learning and teaching.

The TCPQ has 25 Likert-type items and has a single scale that measures the level of learner-centered practices in the classroom for a particular class.

C. Design and Procedure.

Before beginning data collection, seven CCSU professors volunteered to aid in this study. Their permission was required to re-use their former final examination from one of their courses. The Teacher Beliefs Survey (TBS) and Teacher Classroom Practices Questionnaire (TCPQ) were given to the faculty who volunteered their classes for the study. The descriptive statistics of the TBS and the TCPQ, as well as a comparison with the norming sample, are presented in Table 1.

Table 1. Descriptive Statistics for TBS and TCPQ.

Test	Study Sample				Norming Sample			
	n	X	Min	Max	n	X	Min	Max
TBS	7				660			
Factor 1	3.2	2.2	3.8	0.55	3.2	1.0	4.0	0.40
Factor 2	2.0	1.2	2.8	0.70	2.28	1.0	4.0	0.56
Factor 3	2.2	1.3	2.7	0.65	2.31	1.0	4.0	0.49
TCPQ	7	3.1	2.0	3.7	n/a	n/a	n/a	n/a

It was determined that groups whose instructor scored bellow 1/2 a standard deviation from the mean on the TCPQ ($X < 2.85$) will be classified as non-learner-centered (NLC), whereas groups whose instructors scored 1/2 standard deviation above the mean ($X > 3.35$) would be

classified as learner-centered (LC). Two instructors met the criterion for LC, while one instructor met the criterion for NLC. Students in all three classes were invited to participate in the second phase of the study.

The researchers attended the Fall 2001 final exam session of the three selected classes to recruit a sample of students. Each student was asked if they would be interested in participating in this study the following February. They were told their participation would entail them re-taking the multiple-choice final examination they were about to present. They would not have to prepare in any way for the examination, nor would the results have any impact on their academic standing.

Forty-two students voluntarily showed up for the second phase of the study. Data were collected in the Spring 2002 semester; approximately 1 month and three weeks after the original test was given. Testing occurred in separate sessions of 5 to 10 participants each. Students were given the same amount of time they were originally given to complete the examination. In addition, all students completed a short exam motivation questionnaire that consisted of six Likert type items. At the end of the session, the exams were collected and graded. Participants were debriefed, and were told to check our website for the results at a later date. Original scores from the examinations were used as a baseline pretest.

III. Results.

Because all three tests had different numbers of items, all test scores were standardized on a 0-100 point scale. The descriptive statistics for the Pre and Posttest results are presented in Table 2.

Table 2. Descriptive Statistics for pre and post test.

	LC group			NLC group		
	n	X	SD	n	X	SD
Pretest	22	75.0	14.97	20	83.3	12.52
Posttest		66.5	11.43		55.5	14.88
Decline		8.5	14.97		27.8	16.26

First, a single sample pre-post t-test was used to determine if there was a significant decline between the original test scores and the late test scores. For the NLC group, a significant mean decline of 27.8 points, or 33.5%, was observed, ($t=7.65$, $p<0.0001$). The LC group also presented a significant, albeit much smaller decline of 8.5 points, or 11.3% ($t=2.66$, $p=0.014$). In addition, an unpaired t-test was performed on the post scores of the LC and NLC groups, which yielded a significant difference of $t=2.71$, $p=0.01$).

Since differences were observed on the pre-test scores, we performed an Analysis of Covariance to control for these pre-existing differences in performance, using the results of the original test as a covariate, the learner-centered class grouping as the independent variable, and the post-test score as the dependent variable. The results showed a significant Pre test effect of $F(1,38)=4.18$, $p=0.03$. A Bonferroni post-hoc analysis confirmed the significant difference between the LC and the NLC performance on the post-hoc test ($p=0.008$).

To confirm these results and account for the significant pre-test difference, a decline score was calculated by subtracting the post score from the pre score. The LC group had a decline score of $X=8.49$, while the NLC group presented a decline score of $X=27.83$. A t-test

was used to compare the decline score between the LC and NLC participants. The T-test showed a highly significant difference, ($T=-4.02$, $P=0.0003$), indicating the decline for the NLC group was significantly sharper than the decline for the LC group. The extent of the decline is better illustrated in Figure 1.

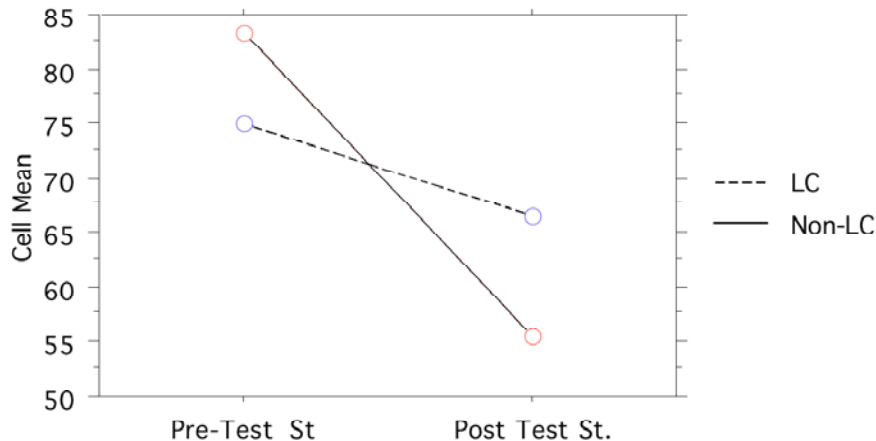


Figure 1. Pre and Post mean test results of LC and Non-LC participants.

Regarding the motivation score, although the LC group presented a higher motivation score ($X=9.09$) than the NLC group ($X=7.95$) a simple t-Test showed the difference to be non-significant ($t=1.61$, $p=0.11$).

These results provide support for our main hypotheses, showing a significant decline in test performance, in spite that the post-tests were identical to the pre-tests, but at the same time the decline was less pronounced if a learner-centered approach to teaching had been implemented in the classroom. At the minimum, this sharp decline in the control classrooms raises the question of the effectiveness of tests to measure learning. At the maximum, the fact that the decline was milder in the Learner Center classes, questions if significant learning is really occurring in the traditional higher education classroom.

IV. Discussion.

McNeil (1986) wrote that “Measurable outcomes may be the least significant result of learning” (p. XVIII). Indeed, the results of this study support the notion that measurable outcomes are not only of slight significance, but also of questionable value, because they tend to not be reliable indicators of long-term achievement. These results support previous evidence not only of the limitations of traditional tests as assessment tools in the higher education classroom (Kohn, 1999; Huba and Freed, 2000), but also of the importance of shifting college teaching towards a more learner-centered paradigm. The present study, however, does not answer the question, to what extent is the decline in performance the result of invalid and unreliable measurement of knowledge by the multiple choice instruments, or a true decline in knowledge because the current pedagogical techniques do not promote deep, relevant learning? Although we suspect that both factors account for the observed declines, future studies should try to answer this question.

In addition, although the present study provides some important information regarding

the interaction between teaching paradigms and the use of tests in higher education, it is a study that is limited by the small sample size, and could certainly benefit from a more longitudinal approach to monitor the decline of knowledge, and to find if there is a floor effect.

In practice, a shift to a more Learner Centered paradigm in higher education could be boiled down to 6 principles that can be applied in any classroom (Adapted from McCombs and Whisler, 1997):

- Choice - Students have different skills, interests and concerns. They should have choice, with support and scaffolding from a facilitator, regarding their own projects and graded assignments, and be able to select areas that are personally relevant.

- Time flexibility: Students learn at different rhythms and are at varied developmental stages. Learning should occur at an individual pace with flexibility of time.

- Uniqueness – Students have different learning styles and personality traits. Therefore, they might be able to show their learning in unique ways, (e.g., written, oral, art, etc.). The focus should be on mastery instead of graded performance, teachers should provide feedback instead of grades, and risk taking and creativity should be encouraged.

- Active: Students learn better when knowledge has to be applied, synthesized and discussed. Therefore they should be actively engaged, participating in individual and group learning activities, instead of passive recipients of information in a lecture.

- Responsibility: When students are responsible for their own learning, they develop self-regulation skills, intrinsic motivation, and learn to value learning on its own and not because of external rewards. They should have increasing responsibility for the learning process, like responsibility for attendance and setting and keeping their own objectives and timetables for projects.

- Critical thinking: The goal of higher education should be the development of critical thinking skills and not the transfer of information. The focus should be on learning how to solve complex, poorly defined and flexible problems that resemble real life problems, instead of the right-wrong, well-defined problems that we only see in school.

Unfortunately, as educational practice often tends to do, instead of trying to move towards research-supported models that promote more significant learning goals, such as motivation, self regulation, self efficacy, creativity, initiative, tolerance, diversity and multiculturalism, we go to the “commonsense” approach of outcomes based assessment that emphasizes the role of raw knowledge and measurable outcomes under the banner of accountability. Only through the continuing study of learning and its assessment, and the education of parents and students regarding research in this area, can we hope to turn education’s focus away from practices that research has shown are more limiting (no matter how politically popular they might be) and towards accomplishing what McNeil would surely consider its most significant results.

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