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Unrealized Consequences of Early Semester Classroom Assessment of Low Achieving Students in Developmental Classes

Charles Secolsky, Measurement and Assessment Consultant, Rockland Community College
csecolsky1947@gmail.com

Thomas P. Judd, Assistant Dean for Academic Assessment, United States Military Academy
thomas.judd@westpoint.edu

Maria Mazocchuk, Associate Professor Candidate, Methodist of Research and Analytic Department, Ukrainian Center for Education Quality Assessment mazorchuk.mary@gmail.com

Steven Holtzman, Principal Research Data Analyst, Educational Testing Service
sholtzman@ets.org

Peter Arvanites, Professor of Mathematics, Rockland Community College
parvanit@sunyrockland.edu

Early in-class diagnostic testing is often used for deciding on students' instructional readiness. However, instructors may not realize that early assessments likely have negative consequences for some students, especially in remedial/developmental classes. Due to being returned a failing assessment back from the instructor, or just a realization of failure on the assessment without ever finding out the result of the assessment, in either case, the failing experience is likely to be associated with feelings of hopelessness, shame, or both, which we believe leads to a loss of performance motivation and subsequent inattentiveness in classwork, excessive absences, discipline problems, failing the course, and ultimately dropping out of college. Conceptually, certain students who fail early assessments may not have adequately "bonded" emotionally, or cognitively with the instructor and classmates, there being not enough time elapsed for the student to become academically or socially integrated into classroom instructional processes, and as a result may need individual support from college student affairs staff. There also could have existed elements of the instructor's behavior, such as negative sounding or reprimanding words and tones emanating from the instructor's verbal expression upon returning failing classroom assessments to the students, or even student perceived negative facial expressions at the time the instructor returned assessments. Because the failing student on an early assessment may be reacting to many potentially different aspects of the failure, the assessment itself or evaluative behavior exhibited by instructor or students, it may not be an easy task to determine what kind of

support a failing student on an early assessment is going to need to overcome the failure encountered from the early assessment.

Yet, this phenomenon involving early assessment and adverse reactions of low achieving students has not surfaced as an important research topic in the assessment literature. In fact, early assessment has been encouraged by assessment specialists and by developers of assessment systems utilized by some colleges that include early intervention proceeding immediately after early assessment. In addition, an examination has been made of the titles of 167 of grant funded studies of assessment over the last ten years, and no titles were found that addressed potential negative consequences of assessments at the elementary, high school or post-secondary educational levels (Institute of Education Sciences, USDOE). It may be conjectured that public and private funds targeted for finding optimal models for diagnosing students' strengths and weaknesses for the aligning instruction with student levels of prior preparation in a subject area, does not appear appropriate of curricula context as with low achieving developmental mathematics skills students at the community college in this study, where early assessments can have damaging effects, especially if part of a classroom assessment.

If it is found in this study that early assessments (the early first assessment) engenders adverse consequences for developmental students then such a finding would not in itself constitute a solution to the failure rates in non-credit bearing developmental mathematics courses and the related problems//concerns of, for example, a college dropout population. Such, a finding would only offer a general guidepost for future study. Determining the factors that resulted in the adverse consequences of early classroom assessment and how to prevent the onset of such student feelings of failure on early assessments, and the negative consequences that feelings of failure can lead to, such as inattentiveness, excessive absences, disruptive classroom behavior, and drops in student motivation, need to undergo study if early assessment is found to be inferior to a delayed assessment practice. A brief review of literature for one of the consequences of student failure on early assessment, a drop in student motivation for performance is presented below.

In brief, components of motivation include a sense of autonomy that the individual is in control, a sense of competence, recognition of the value of the activity or goal, and a sense that performance is related to something broader. Deci and Ryan (1982) have identified that controlling experiences and experiences that show a lack of competence can undermine both extrinsic and intrinsic levels of motivation. Experiences that provide feedback that the individual is being controlled, is associated with reduced competence, or when the student is somehow disconnected from their classroom experience, this apparent inattentiveness also is an indicator of reduced motivation to perform in the classroom.

The distinction between intrinsic and extrinsic motivation has been a useful in motivational studies, and the effect of failure and success feedback on subsequent motivation has been examined systematically in numerous early studies in motivational theory. For example,

Boggiano and Barrett (1985) found differences in performance in children in grades 4 to 6 who were extrinsically versus intrinsically motivated after receiving failure performance feedback, with the extrinsically motivated children exhibiting significantly poorer performance and expressing an elevated level of learned helplessness. In a subsequent study, children who reported higher levels of academic competence had a higher level of intrinsic interest in work and preferred greater challenges when placed in evaluative situations than children who reported lower levels of academic competence (Boggiano, Main and Katz, 1988). In a study of high school mathematics students in Norway, (Vals and Sovik, 1993) found that students' intrinsic motivation was related to their perception of teacher's controlling behavior in the classroom and their own sense of competence. Teacher's controlling behavior is negatively related to a sense of autonomy, and negative evaluative feedback is related to a sense of lowered competence.

Shame is also a motivational component that may play a significant role in individual student performance and is linked to low self-concept of academic performance and test anxiety. Turner, Husman, & Shallert (2002) in reviewing the research demonstrating the interconnectedness of emotions and academic goals have concluded that in academic settings shame affects self-regulatory and goal-attainment processes, which, in turn, influence motivation.

Research over three decades as summarized by Pascarella & Terenzini (2005) has shown that grades in college continue to be one of the most consistent predictors of persistence, and the relation between academic performance in the first year is a consistently strong predictor of persistence in college, and that good grades are associated with lower dropout rates especially in the first year. They also concluded that the preponderance of evidence from the studies examined show that comprehensive support programs do have a positive effect on persistence. These studies examine persistence from semester to semester, or from academic year to academic year, but not through the duration of a single semester.

This study involved classes designed for students whose mathematics skills were not at the level required for successful completion of college level mathematics courses. These courses are intended to develop an understanding of mathematics operations and reasoning in preparation for freshman level college mathematics. Students eligible for these courses may already have demonstrated a level of low achievement in mathematics in their secondary school experiences, and yet are sufficiently motivated to enroll in a post-secondary program or institution. It is our contention that while these students probably have the desire to achieve and value their education, the effects of early assessment in these basic mathematics skills courses undermines their confidence in their ability, and subsequently their motivation to achieve is significantly compromised. By delaying the first exam until later in the semester, students may be more emotionally equipped to diminish the negative consequences of the failing experience because they likely have gone beyond the absence of emotional and cognitive "bonding" with the instructor and classmates, and concomitantly have more opportunities to experience success by way of greater self-control, greater academic and social integration into the instruction delivered

in the classroom, and are subsequently more able to maintain levels of motivation necessary to complete the course.

The hypothesis of this study is that low achieving students in developmental mathematics courses who are given their first exam early in the semester will perform more poorly in the course as indicated by the grade they receive than students who are given their first exam later in the semester. The independent variable is class session of the first exam (early or later in the semester), and the dependent measure is the instructor's judgment of the student's performance in the course (final grade).

Method

A request was emailed to all faculty members teaching developmental mathematics at a community college in New York State to provide the course session number in which the first exam was given. This data was combined with the last date of attendance of each student, and final course grades, all taken from existing registrar data from the fall 2018 semester. Table 1 presents the number of students who were given their first exam in class sessions 2, 3, 4, 5, 7 and 8. Of the 303 students in the class sections for whom data was obtained, 109 (36%) were given their first exam in the 2nd or 3rd class session, 125 (41%) were given their first exam in the 4th or 5th class session, and 69 (23%) were given their first exam in the 7th or 8th class session.

Table 1: Frequency Table for Number of Class Session in Which First Test was Given

Class session	Frequency	Percent
2	19	6.3
3	90	29.7
4	43	14.2
5	82	27.1
7	43	14.2
8	26	8.6
Total	303	100

Of these 303 students, final grades were given to 286, with a pass rate of 61% (Table 2). The 17 students for whom there was no final grade either withdrew from the course or received a grade of incomplete. In fact, the last date of attendance for 30 of the 303 students was before the halfway point of the semester, suggesting that their level of motivation may have been sufficiently compromised to preclude them from completing the course. Although tuition refunds may be a component of some of the earliest withdrawals from the course, at this college, there is no refund after the third week of classes, and there were only four students whose last date of attendance was during that prior to the last date for tuition refund.

Table 2: Frequency Table for Course Grade

	Frequency	Percent
Fail	101	33.3
Pass	185	61.1
Total	286	94.4

Results

An initial Pearson Correlation Coefficient was obtained for the relationship between class session of the first exam and the course grade of .156 ($p<.01$) (Table 3). While significant, this is a relatively low correlation, and may be attributable in part to the sample size. A second significant Pearson Correlation coefficient of .648 was obtained between last date of attendance and course grade. Before computing this correlation, the actual sequential date, which covered the period September 1, 2018 to December 21, 2018 was transformed to numerical values, ranging from 1 to 112. In order to more appropriately compare early versus delayed testing, it was decided to compare students whose first exam was in session 2 or 3 (early) with those whose first exam was in session 7 or 8 (delayed).

Table 3: Pearson Correlation Coefficients for Course Grade, Last Date of Attendance, and Class Session of First Exam

	Final Grade	Date of last attendance	First Exam Session
Final grade	1	.648**	.156**
Date of last attendance	.648**	1	0.106
First Exam Session	.156**	0.106	1

**Correlation is significant at the 0.01 level (2-tailed).

An independent samples t-test showed a significant difference between the early and delayed exam groups on the final course grade ($t= -3.906$, $p<.001$; Table 4). Students who were administered their first test during the second or third class session had significantly lower final course grades than students who were administered their first exam during the seventh or eighth class session.

Table 4: t-test on Grades between Early First Exam (session 2 or 3) and Delayed First Exam (session 7 or 8).

		N	Mean Grade	Std. Deviation	Std. Error Mean	T	p-value
First exam	Early	105	1.63	0.486	0.047	-3.906	<0.001
	Delayed	64	1.88	0.333	0.042		

Discussion

The results of this study are significant in that potential negative consequences of administering tests early in the semester for low achieving students in developmental math courses were identified for the community college in the study. Students who were given a test early in the semester had significantly lower course grades than students who were administered their first exam later in the semester. While early testing may provide important diagnostic information for faculty, it may have adverse consequences for students whose components of motivation may be borderline, and subject to degradation with this early testing experience.

Various components of motivational theory described in the introduction have value in understanding this phenomenon. If students have a low level of competence in their mathematics performance, feedback may undermine their motivation to succeed. If students have the perception that the faculty member is highly controlling, their sense of autonomy may be reduced, and their motivation may be undermined. If students do not have the opportunity to feel a sense of integration into the academic and social atmosphere of the course before the onset of a low performance level, their motivation may be undermined. With early failure experience, students may experience hopelessness, shame, leading to inattentiveness in coursework, excessive absences, discipline problems, failure to complete work, failing course grades, and possibly failure to complete college.

It is possible that these findings could vary between institution types. Pascarella and Terenzini (2005) in their comprehensive analysis of three decades of research on college students have concluded that student persistence in college is related to how integrated they feel academically and socially. This is even more important for student who are at academic risk. At commuter schools such as the community college where the students in our study were enrolled, where there are fewer opportunities for social activities, academic integration becomes more significant. In residential institutions, social integration can compensate for low levels of academic integration.

Future research should follow several lines of descriptive inquiry: using motivational theory; which components of motivation are significant in this phenomenon? Which student characteristics such as goal orientation, resilience, academic self-concept or shame make them more susceptible to which motivational components and persistence? Does this phenomenon differ by institution type? Do first year seminars, systematic advising, or other interventions ameliorate this phenomenon?

Even before the relevant components and student characteristics are identified as being susceptible to the problems of early assessment, various conditions representing different times for the number of class sessions in which the first classroom assessment is administered should be studied experimentally and quasi-experimentally. For example, the treatment group could take the first exam at the time of the midterm, and the exam could consist of a series of quizzes separated by review sessions on earlier work covered but not previously tested. There could conceivably be many extensions to investigate because of the significant results found. For example, it would be worthwhile to examine the effects of early classroom assessment that involves only the types of feedback, e. g., positive or negative, that the instructor exhibits verbally with students as opposed to classroom assessments consisting of the first exam of the semester. In addition, studies could also be conducted to identify pedagogical or intervention strategies that do not adversely impact the intrinsic motivational levels of low achieving students. It may be that the diagnostic assessment of students is compromised, and alternative strategies for diagnosis may have to be developed that avoid the consequences identified in this study.

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