Pedagogical Research in Psychology:

Effective Teaching and Learning in the College/University Classroom

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Abstract

This preliminary research report offers readers an example of pedagogical research within the context of an educational psychology course. The research questions dealt with: 1) the effectiveness of a course pre-requisite, 2) the value of a class attendance policy, and 3) early indicators in the course of success or failure. Previous psychological knowledge (pre-course knowledge) as measured by a quiz at the first class session was found to be significantly correlated to exam performance (11 % of variance explained) suggesting the existing course pre-requisite was functioning properly. Class attendance (% of classes attended) was consistently found to be a predictor of exam performance in the course (14 % explained variance). Thus, the current class attendance policy was deemed to be useful and worthy of continuation. Student performance on the first major multiple-choice exam was found to be a powerful predictor of final class average at the end of the course (79% of variance explained). Therefore, the first major exam serves as an important benchmark for students in terms of confidence builder for early success or an early warning device for poor performance. The collective results reported here support the contention that research-based pedagogical findings can be useful in promoting reflective teaching and improved student learning.

Keywords: instructional effectiveness, pedagogical research, higher education

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If teaching at any level is destined to be a truly reflective and effective enterprise, research on one's own teaching is essential for professional development and self-improvement, the enhancement of student learning outcomes, and the advancement of the profession. Shulman & Shulman (2004) seemed to echo a similar viewpoint when describing their Fostering Communities of Teachers as Learners (FCTL) project and suggesting that "an accomplished teacher is a member of a professional community who is ready, willing, and able to teach and learn from his or her teaching experiences" (p. 259). The research described in this report fits within this theoretical and philosophical paradigm and is focused upon the domain specific concerns related to the teaching of educational psychology at the college/university level. While the research outcomes reported here are specifically related to the teaching of a psychology course, the procedural and process components and the research questions employed here might well be applicable to pedagogical concerns throughout a wide variety of courses in higher education.

One prominent source of the problems related to college teaching stems from the very manner in which we prepare professors. Herman (1988) suggested that "a teacher of high school seniors must be certified and trained in a content area and in pedagogical techniques. Yet, teachers of first-year college students must be trained only in a content specialty." (p. 4). Such a troublesome circumstance predictably evolves from such a paradigm.

The famous behavioral psychologist, B.F. Skinner (1987) astutely identified this age-old problem in academia.

It has long been said that college teaching is the only profession for which there is

no professional training. Would-be doctors go to medial schools, would-be

lawyers go to law schools, and would-be engineers go to institutes of technology,

but would-be college teachers just start teaching. (p. 121)

What Skinner acknowledges is that professional training for specific careers in medicine, the

legal field, and engineering has taken priority over teaching in such fields. At one point in

history, many might have subscribed to the adage that if you "really know" a field you are able

to teach it and prepare those who will eventually work in the field. A healthy signpost in

academia is that such a viewpoint holds considerably less credibility today.

It might even be said that we currently live in an era where research on college teaching

has risen to a new plateau of respectability. During my own professional career of well over

three decades, I have seen the advancement of research findings and scholarly writings on

teaching and learning in academic content areas expand at an exponential rate. Although this

paper is not the proper forum to highlight the advancements in the teaching and learning of

mathematics, physics, art, music, history, political science, or other fields, a quick search in

ERIC or other databases will offer many useful insights, strategies, and research findings offered

by professors and teachers in such disciplines.

My discipline of psychology has certainly taken the teaching of psychology more

seriously in recent decades. During a published interview, Bill McKeachie (former Chair of the

Department of Psychology at the University of Michigan) highlighted one catalyst when he

stated that "in the 1960's and 70's the student movement pressed for better, more relevant

teaching which enabled me to promote faculty members on the basis of excellence in teaching"

(Herman, 2000, p. 9). The *Teaching of Psychology* publication of APA Division 2 traces its

roots back to 1945 and membership in Division 2: Society for the Teaching of Psychology

peaked in 1976 with about 2,600 official members. Today, membership in Division 2 officially

stands at just over 2,000 members, but when affiliates are considered the current membership

approaches 3,000 (see APA Div 2 website http://www.teachpsych.org/members/stphistory.php).

Obviously, many psychologists today take their teaching roles and responsibilities very

seriously.

During recent decades, many intervention strategies on campuses have been employed in

order to shore up the often accurately perceived weakness in the preparation of college teachers.

Doctoral training at major universities has created college teaching certificate programs,

professor-graduate student mentoring tracks, and teaching resources for graduate students who

envision a career emphasis in teaching rather than research or one that balances teaching with

research.

Most college campuses today have a center or at least an office devoted to the promotion

of faculty excellence in teaching that provides pedagogical research information, workshops,

mentoring, and sharing of ideas related to teaching and learning. The Learning and Teaching

Excellence Center (LTEC) on my own institutional campus offers precisely such resources.

Many excellent books exist for college teachers such as *Teachng Tips: Strategies, Research, and*

Theory for College and University Teachers (McKeachie, Svinicki, & Hofer, 2006). Another

excellent college teacher resource is the *Handbook of Educational Psychology* (Berliner &

Calfee, 1996).

Pedagogical research is normally conducted in order to offer empirical support for the

improved decision making conducted by teachers and students in an educational setting. The

over-arching purpose of such research is to ensure that learning, instruction, and evaluation are

coordinated and driven by empirical data rather than more subjective hunches, traditions, fads,

whims, or educational trends. If a teacher is schooled in the scientific method, this approach to

pedagogical decision making should seem logical and straight forward. The college teacher

trained more in the humanities should not instinctively balk at such research strategies, since the

statistical analyses employed in this type of research do not need to be daunting or complex.

As a college professor concerned about teaching and learning in my own classroom, I

wish to promote the use of research in everyday teaching as a useful tool to inform my teaching,

help students learn, settle curriculum concerns, and set course policy. I also serve as a crucial

role model in my classes, since my major responsibility is to prepare future teachers and other

professionals. It seems obvious to state that such pedagogical concerns should be of

considerable interest to teachers in all disciplines and across college/university course

boundaries.

The current study revolved around three important educational research questions in an

Educational Psychology course. The following research questions were generated by the course

instructor after several years of college teaching in this field.

1. How important is the current course pre-requisite of Introduction to Psychology or Child
   Development?

2. Does a regular pattern of class attendance make any difference in the final grades of
   students?

3. What type of early predictors in the course might be used as an estimate of final grade in
   the class?

Method

Participants

Data collection was completed during the fall semester of 2007 in three sections of the research investigator's own course at a relatively small rural campus of a state university system with a total undergraduate and graduate population just under 4,500 students. Approximately 80% of the 98 students in the classes were female. Most students took this course because it was a requirement in their teacher preparation program. The class year breakdown indicated that 95% of students held either junior or senior undergraduate status.

Materials

Many of the variables were easy to operationalize, such as attendance (percentage of classes attended based upon a full signature of each student at every class session) and exam/assignment scores recorded in the instructor's gradebook. A more challenging task was creating a brief measure to test for the previous psychological knowledge that each student brought to the course on the first day of class. A pre-test was created based upon content included on upcoming classroom exams and content known to exist in both of the pre-requisite courses. It was decided that such a pre-test would have to be administered on the first day of class in order to offer the most accurate measure of current knowledge of psychology prior to starting the course. The course was structured so that 80% of each student's grade was determined by performance on multiple-choice exams, 10% by an essay exam, and 10% by a computer assignment using the Statistical Package for the Social Sciences (SPSS). Most of the items on the multiple-choice exams were written at higher levels of learning such as application, analysis, synthesis, and evaluation according to the Taxonomy of the Cognitive Domain (see Bloom, Engelhart, Frost, Hill, & Krathwohl, 1956)

Research Hypotheses

The following research hypotheses were derived from the research questions:

Hypothesis #1: Students performing better than their peers on the Pre-Test of Previous Psychological Knowledge should also perform better than their peers on academic achievement (the first multiple-choice exam, future multiple-choice exams, and final class average). Conversely, students who do more poorly than their peers on the Pre-Test of Previous Psychological Knowledge should perform worse than their peers on the same measures of academic achievement.

Hypothesis #2: Students who attend class more frequently than their peers should perform better than their peers on measures of academic course achievement. Conversely, students who attend fewer classes than their peers should perform more poorly on such measures of academic achievement.

Hypothesis #3: Students who perform well as compared to their peers early in the course will do well in terms of their final average and grade in the course. Conversely, students who perform poorly on the exams early in the course will do more poorly than their peers in terms of final average and final grades.

Design and Procedure

Each variable was in the form of an interval scale, values were continuous, no variable was dichotomous, relationships were believed to be linear, and covariation was to be explored. The Pearson Product Moment Correlation Coefficient was employed for statistical analysis. Although an assumed cause and effect relationship could be established for some of the variables, the current analysis did not employ the use of linear regression for two reasons: 1) to offer greater conciseness and uniformity in the reporting of results in this report and 2) the intended recipients of such results (students) in class had only studied correlation and not linear

regression. The use of the correlation coefficient here to compare only two variables at a time should offer a conservative estimate of actual relationships between these variables. The regression analyses will be conducted as another phase of the project and will be reported in a different forum. Gender differences will also be explored in the next phase of the study.

Results

Table 1 depicts the descriptive statistics for the variables in the study. Scores on the Pre-Test of Previous Psychological Knowledge were low (ranging from 0-23 as compared with 50 points possible on the measurement instrument). Mean scores on Exam #2 (57.58 or 77% correct) improved slightly from Exam #1 scores (53.94 or 72% correct). The smallest amount of variance (sd=2.56) was found for the first computer assignment which also had the fewest possible points (25 points).

The relationships between variables are depicted in Table 2. The Pre-Test of Previous Psychological Knowledge was found to be a statistically significant predictor of performance on Exam #1 (r=.30 **), Exam #2 (r=.31 **), Essay Exam (r=.32 **), and Final Class Average (r=.35 **). Hypothesis #1 was supported.

Class attendance was found to be a slightly more powerful predictor than the Pre-Test of Previous Psychological Knowledge in all but one case. Class attendance was found to be a statistically significant predictor of academic performance on Exam #1 (r=.42 **), Exam #2 (r=.37 **), Essay Exam (r=.28 **), and Final Class Average (r=.44 **). Hypothesis #2 was supported.

The first major multiple-choice exam in the course was found to be a statistically significant predictor of future multiple-choice exam performance. Exam #1 was correlated to Exam #2 (r=.80 **), the Essay Exam (r=.58 **), and Final Class Average (r=.89 **). Hypothesis

#3 was supported. Exam #2 was found to be a more powerful predictor of Final Class Average
(r=.93 **) than Exam #1.

<div align="center">Discussion</div>

The low scores on the Pre-Test of previous Psychological Knowledge can be explained
by the poor retention of course information over time. Empirical support for this lack of
academic content retention comes from Ellis and Rickard (1977) who found that introductory
psychology students remembered only 33% of the course information 4 months after taking the
course.

The fact that the Pre-Test of Previous Psychological Knowledge was positively related
with academic performance strengthens support for the future use of existing course
pre-requisites. Class attendance generally tended to slightly outperform the Pre-Test of Previous
Knowledge as a predictor of exam performance. If the correlations were near zero, it could be
more easily argued that previous content knowledge and attendance in class are unrelated to
exam performance and therefore prerequisites and attendance logically should not be required.
Clearly this is not the case, so the results support the continuation of the existing pre-requisite
and the attendance requirement.

An instructor would ideally like to offer students accurate feedback regarding how
strongly performance on the first multiple-choice exam is a predictor of final course grade and
future exams. The correlation of r=.89 between Exam #1 and Final Class Average allows the
course instructor to claim that 79% of the variation in final grades can be explained by student
performance on the first major multiple-choice exam early in the semester. Such results also
strengthens the assertion by the instructor on the first day of class that "getting off to a good start

in this course" is crucial to academic success. The fact that 80% of each student's final grade is derived from multiple-choice exams helps to make this finding understandable.

The results from this study have assisted the course instructor in making pedagogical decisions and this information has been shared with students for three important reasons: 1) the students are studying correlation coefficients and scatterplots in the course; 2) this information can help students take more responsibility regarding their own learning and make better decisions; and 3) since most of these students plan to become teachers, they learn how research on one's own teaching can improve the quality of teaching and learning. In an era where student outcomes and accountability continue to be at the forefront at colleges and universities, pedagogical research that can easily be conducted by instructors and graduate assistants holds great promise for the improvement of teaching and learning in higher education.

The collective results reported here support the contention that even correlational findings that do not guarantee the portrayal of cause and effect relationships can still be useful in promoting reflective teaching and improved student learning. A key ingredient in my recent teaching has been the sharing of the Pre-Test of Previous Psychological Knowledge and the correlational findings contained in this report with students in my classes each semester. Such research findings that highlight the relationships between previous psychological knowledge, class attendance, and class performance trends need to be shared with students in order to promote student learning and academic success. Such an approach to college teaching closely mirrors what Adler and Matthews (2009) suggested when they recommended that college teachers adopt a "transparent position" with respect to their own teaching.

The dissemination of classroom research findings sparks student interest because such research holds personal relevance and guides students in making strategic academic decisions.

This instructional strategy also motivates students by reducing uncertainty and allowing them to learn from other students who previously completed the course. The practical importance of research, the scientific method, and simple, yet powerful, statistics like the correlation coefficient is promoted in a class where such research content (scientific approach, educational research, and correlational findings) is also already part of the course content and covered in the textbook.

It seems important to remember that unless a course instructor chooses to share such pedagogical research with students, those who might benefit the most from such valuable information will never have access to what they need to become active, self-regulated, and responsible learners. Such an approach to teaching in the classroom that empowers students dovetails and is consistent with several prominent motivation theories such as mastery learning (Covington, 1992), attribution theory (Weiner, 1986), achievement motivation (Atkinson, 1983), learned helplessness (Seligman, 2006), and self-efficacy (Bandura, 1997).

Summary

I am reminded of an insightful point made over two decades ago by David Berliner when he suggested that expert teachers "are bothered by patterns they don't understand" (Brandt, 1986, p. 7). This spirit of questioning and the research-based inquiry that logically follows such questions has been the guiding force as I continue to strive toward excellence in my own teaching. This very report is an outgrowth of asking questions like: Why do I have a pre-requisite for my class? Is such a pre-requisite justifiable? How do I know that attendance in my classes makes a difference in student learning? What type of early feedback in the course might guide students in their journey through the class and produce success for more students?

My guess is that I am not alone in asking such pedagogical and curricular questions. It seems natural for me to apply my research training to better understand my own teaching and

how learning could be enhanced in my classroom. I realize that not everyone is trained in such

empirical traditions, but the type of research outlined here is simple enough to be adopted by

many other professors and graduate assistants. My teaching circumstance is one where I happen

to be teaching about research methods and the correlation coefficient, so in reality, I am only

using statistics here that I am trying to teach all my future teachers. This is my attempt to not

only "talk the talk" during lectures, discussions, and group activities; but also "walk the walk" by

demonstrating to prospective teachers how I actually use such research to enhance, improve, and

validate my own teaching. In my own small way, I hope to have a positive influence upon the

improvement of the teaching profession at the Preschool-12th grade and higher educational

levels.

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Table 1

Descriptive Statistics for Variables

Variable	n	M	SD	Maximum	Minimum
Pre-Test	97	5.87	3.57	23.00	0.00
Attendance	98	87.55	9.04	100.00	46.00
Exam #1	98	53.94	11.30	73.00	27.00
Final Class Ave.	97	78.01	12.09	99.00	47.00
Essay Exam	89	39.56	5.52	50.00	24.00
Computer Task	96	21.16	2.56	25.00	12.00
Exam #2	94	57.58	10.49	74.00	29.00

Operational Definitions of Variables

Pre-Test (total number of correct responses to the Pre-Test of Previous Psychological Knowledge administered on the first day of class—possible 50 points)

Attendance (percentage of classes attended)

Exam #1 (total number of correct answers on the first 75 item multiple-choice exam)

Final Class Average (percentage of points earned out of 500 at the end of the class)

Essay Exam (total points earned on the in-class essay exam out of the possible 50 points)

Computer Task (total points earned on the first computer assignment out of 25 points)

Exam #2 (total number of correct answers on the second 75 item multiple-choice exam)

Table 2

Correlations Between Class Activities and Major Predictor Variables

Class Activities	Academic Performance Variables			
	Exam #1	Exam #2	Essay Exam	Final Class Ave.
Pre-Test	.30 **	.31 **	.32 **	.35 **
Attendance	.42 **	.37 **	.28 **	.44 **
Essay Exam	.58 **	.67 **		.71 **
Computer Task	.33 **	.35 **	.39 **	.42 **
Exam #1		.80 **	.58 **	.89 **
Exam #2	.80 **		.67 **	.93 **

Note: N values ranged from 88 to 98 subjects for the above variables due to the fact that some students dropped the class before the end of the semester and did not complete all of the exams. When such students dropped the class or no longer attended class, the Final Class Average was calculated as the percentage of earned points out of the total possible points at the point of class departure.

**p<.01.