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An examination of traditional and nontraditional students' evaluations of professorial leadership styles: transformational versus transactional approach

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Abstract: The present study was designed to empirically examine how traditional and nontraditional students varied in their perceptions of and appreciation for "Transformational" versus "Transactional Leadership" Styles as indicated by their survey responses. An "accidental" sample of 150 participants from the general student population at a college in the rural southeastern region of the United States participated in the investigation. The critical questions raised in the present study were whether traditional students differed from nontraditional students on the set of four transformational leadership styles scales. None of the four scales differed by student type. A similar hypothesis was tested with a set of independent samples t-tests. Only the t-test for grade orientation 2 was even marginally significant. Traditional students reported a marginally higher level of grade orientation than nontraditional students. Implications for college professors and administrators are discussed.

Keywords: Transformational, Transactional, Leadership, Traditional, Nontraditional.

I. Overview.

A systematic review of relevant scientific literature reveals a dearth of empirical research that specifically examines the types of instructional and/or classroom leadership style(s) most preferred by both traditional and nontraditional college students. From a general education perspective, Stewart (2006) reports that the overall quality of instructional and/or classroom leadership has typically been determined on the basis of students' test scores. However, the apparent link between students' test scores and their possible preferences for one type of instructional leadership over another has garnered little empirical attention.

We believe this critical issue of students' perceptions and evaluations of professorial leadership style takes on a much greater importance when recognizing the ever increasing number of nontraditional students entering and reentering college. One may question whether an older or nontraditional student would prefer a professor who rewards or punishes a student for his or her academic performance or a professor who seeks to transform the student into a leader.

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The major research question addressed in the present study is whether or not nontraditional students differ from traditional students in their appreciation for and evaluation of different professorial instructional leadership styles? It stands to reason that if students prefer and evaluate one leadership style over another, then such cognitive activity may manifest itself in their academic behavior and performances.

II. Transformational and Transactional Leadership Styles.

Essential to the present investigation is the basic assumption that professorial leadership styles may influence students' academic performances. Burns (1978) theorized that the process of leadership itself actually occurs in one of two ways: either via a transactional or transformational mechanism. For example, in a transformational classroom environment the professor is expected to be dynamic, flexible, stimulating, encouraging, enlightening and visionary (Hallinger, 2003; Stewart, 2006).

The transformational styled professor facilitates students' understandings of how a particular course relates not only to his or her present life, but to his or her future and possibly their children's future (Hallinger, 2003). Even those students who appear on the surface to be less knowledgeable and less comfortable with their learning environment are encouraged to understand that what they bring to the discussion is as important as what students who appear more knowledgeable have to say (Stewart, 2006).

Transactional leadership was purported to rest upon bureaucratic authority and legitimacy (Burns, 1978; Hinkin and Tracey, 1998). Burns (1978) further stated that transactional leaders place greater emphasis on work standards, assignments, and task-oriented goals. In addition, transactional leaders are suggested to place a great deal of focus on assignment completion and overall student compliance with the demands of the organization (Hinkin and Tracey, 1998). Followers (i.e. students) in a transactional based system are approached by the professor with the intent to exchange and/or reward a grade with performance that is generally based upon exam scores (Burns 1978). Stewart (2006) notes, for example, leaders utilizing the transactional leadership style may reward the hard-working professor with an increase in salary or tenure; or the professor (i.e. classroom leader) may reward a student with not having to take the final exam as a result of his or her performance on previous exams and/or papers.

In the transactional leadership model, goals and objectives are set, measured, evaluated, and modified by the professor with minimal or no input from those who are deemed instrumental in making sure that such goals were reached (Bass, 1998; Burns, 1978; Hinkin and Tracey, 1998; Stewart, 2006). This notion may be manifested in a college environment when the professor develops a syllabus and course content with minimal input from the actual students (Leithwood, 1992). The incentives are set to ensure that students work diligently, if not efficiently, to make sure that the course objectives are met (Stewart, 2006). Of course, some students work fervently to get the job done because their academic wellness, possible graduate school, and possible personal economic welfare are tied to graduating with a respectable grade point average (Hinkin and Tracey, 1998; Stewart, 2006). Transactional leadership is centered on a form of operant conditioning whereby employees or even students perform certain duties and tasks to receive rewards and to avoid punishment (Hinkin and Tracey, 1998; Leithwood, 1992; Stewart, 2006).

In stark contrast, Burns (1978) characterized transformational leadership as a process that motivates followers by appealing to higher ideals and moral values. Importantly, transformational leadership style is thought to be applicable to a number of arenas including, but

not limited to: the military, educational advancements, businesses, medical complexes and other domains as well (Bass, 1998; Burns, 1978; Leithwood, 1992; Stewart, 2006).

Transformational leaders must be able to define and articulate a vision for their organizations, and the followers must accept the credibility of the leader (Bass, 1998; Burns, 1978). The leader must look for potential motives and hidden capacities and abilities in their participants and then seek to enhance those motives and capacities via transformational instruction (Burns, 1978; Leithwood, 1992). Transformational leadership is said to represent a mutual relationship that transforms followers into leaders and leaders are transformed into change agents (Bass, 1998; Burns, 1978; Leithwood, 1992; Stewart, 2006).

Bass (1998) found empirical evidence to support the idea that transformational leadership is quite important and that it possesses the capacity to inspire people beyond what was expected by themselves and by others. Additional support for the empirical efficacy of transformational leadership comes from Howell and Avolio's (1993) findings that branch managers' transformational leadership (operationally defined as charisma, intellectual stimulation, and individual consideration) predicted consolidated business unit performance one year later.

There are at least two additional studies using experimental designs that have indicated the specific role of "transformational leadership" as a precursor to increased or better performance among students. Howell and Frost (1989) found that student participants working under charismatic and/or transformational leaders demonstrated higher task performance than those working under considerate leaders. Kirkpatrick and Locke (1996) conducted a laboratory study, with business students as participants, in which they manipulated three major aspects of charismatic/ transformational leadership, namely: vision, vision implementation through task cues, and communication style. The results of their study revealed that only vision and vision implementation affected performance outcomes and attitudes. However, the leaders' charismatic communication style influenced followers' perceptions of charisma (Kirkpatrick and Locke, 1996).

Derived from the transformational process is the critical tenant of mutual admiration. In the transactional leadership arena mutual admiration is tied more to a student's grade than to whether the student's displayed increase levels of motivation and morality through mutual respect and admiration (Bass, 1996; Burns, 1978; Leithwood, 1992; Stewart, 2006). According to Burns, (1978, p. 20), this latter form of leadership and mutual admiration seeks to "raise the level of human conduct and ethical aspiration of both the leader/professor and led/student, and thus it has a transforming effect on both."

Transformational leadership is thought to produce a change that benefits both the relationship and the resources of those involved (Stewart, 2006). The result is a change in the level of commitment and the increased capacity for achieving their mutual purposes (Williams, 2006). Leithwood's (1992, 1992a) studies determined that transformational leadership in education was limited but uniformly positive in the classroom. Transformational education in the classroom required visionary and moral/ethical leadership (Siegrist, 1999). Thus, it can be suggested that transformational leadership made a difference in achieving success in the classroom and in meeting the goals and mission for administering education.

In this model, exchange is viewed from a more lateral position than from a linear position. In doing so, staff members and students may feel more ownership with the project and the actual course. Here the incentives are based upon group efforts and rewards rather than upon individual efforts and rewards.

III. Traditional vs. Nontraditional Students.

Consistent with the specific focus of the present study, it is reasonable to think that through the college education process most students would like to see their lives transformed for the better. This may be particularly true for nontraditional students who may seriously question whether they have the cognitive skills and time allocation needed to compete with more traditional students. In a transformational classroom environment, nontraditional students are viewed as an integral part of the class because they may invoke real world experiences into the classroom discussions.

On the other hand, the nontraditional student may not want to receive instruction that goes beyond what is found in their textbook. As well, nontraditional students may not prefer professors who display charisma, vision, intellectual stimulation and other important characteristics found in the transformational leadership style. Instead, nontraditional students may prefer to stay focused on the specific course materials and receive a good grade and move on to the next class. This may be true due, in part, to a greater sense of urgency about graduating.

There is an important third possibility that exists within the transformational versus transactional leadership area. It is a clear possibility that students have a preference for both transformational and transactional leadership characteristics. It is clear that transformational leadership styles are not orthogonal to transactional leadership styles. Put simply, the two constructs are not deemed mutually exclusive of one another.

For example, research conducted by Avolio et al. (1995, 1996) and Bass and Avolio (1997) found high correlations among the five transformational scales and the transactional scale of contingent reward. According to Bass and Avolio (2000) these findings were to be anticipated because transformational and transactional leadership are both active as well as positive forms of leadership styles. To this end, students may show a preference for a professor who displays charisma and intellectual stimulation and still be committed to staying focus on the specific course materials and their final grades.

To our knowledge no previous study has sought to examine how traditional and nontraditional students perceive and evaluate professorial leadership styles. Therefore, the present study may best be viewed as exploratory in nature. In that much of the transformational/transactional literature is related primarily to corporate America, the present study is designed to begin a series of research that will examine the applicability and viability of incorporating components of the “transformational leadership” model into the college classroom. The college classroom was selected because from a traditional perspective, college classrooms and the college environment parallel the types of personnel in virtually all corporate environments. As such, this is the first in what is to be a series of studies designed to illuminate some of the more efficacious factors that impact traditional versus nontraditional students’ evaluations and academic performances from a professorial leadership style perspective.

IV. Methods Section.

A. Participants.

An “accidental” or convenience sample of 150 participants from the general student population at a college in the rural southeastern region of the United States participated in our

investigation. Respondents in the study were college students who volunteered to participate; they received neither remuneration nor course credit for their participation.

In the present study, there were 85 (56.7%) women and 65 (43.3%) men; there were 62 (41.3%) traditional students and 85 (56.7%) nontraditional students. The mean age was 29.75, with a range from 18 to 55 years of age. Forty-eight (32%) of the students were first generation college students.

For the purposes of the present study, the traditional student is operationally defined as students who are between the ages of 17 and 24. Nontraditional students are operationally defined as students who are age 25 or over. All selection and methodological procedures were approved by the Human Subjects Review Committee (HSRC) and were in accord with the ethical standards and requirements set by the overall college committee.

B. Materials.

A critical aspect of this study was to measure how traditional and nontraditional students perceived and evaluated professorial leadership styles from both a transformational and transactional perspective. Most of the previous research conducted on leadership styles had featured scales that were not amenable to the specific focus of the present study. Therefore, Dr. Ronald Lynn Poulson developed a survey entitled the Professorial Leadership Style Questionnaire (PLSQ). Dr. Poulson designed the survey around characteristics featured in both transformational and transactional leadership research.

Once, the survey was developed, it was pilot-tested by both the first and second authors. The survey was then presented to both faculty and students to view for face validity. Following these iterations, a final number of 50 Likert Scale items (very much – to not at all) were included in the PLSQ (for copies and a full and detailed discussion of the PLSQ, please contact Dr. Ronald Lynn Poulson at Elizabeth City State University).

V. The Professorial Leadership Style Questionnaire (PLSQ).

A. Vision.

Having ideas and a clear sense of direction, communicating the ideas, and developing enthusiasm towards accomplishing the goals (Politis, 2004). This study featured four questions that dealt directly with the “Professor’s Vision” for the course. For example, question 5 asked: To what degree do you believe that your college professors should possess a positive vision about your future chances in life?

B. Charisma.

Charisma is associated with creating and developing enthusiasm by using through the power of personal regard for their students (Politis, 2004). For example, question 43 asks: On a scale of 1 to 7, how much do you appreciate professors who are full of energy and drive about transforming students’ lives?

C. Intellectual stimulation.

Inspiring students to want to go beyond being and doing average work; inspiring students to want to be more critical in their thinking and engage in critical debate about various topics which in turn will help to transform their lives (Politis, 2004). For example, question 19 asks: how important is it to you that college helps to transform your way of thinking?

D. Creativity.

Developing a new way of doing old things. Employing new strategies to attack old problems; use creativity to get students to go the extra mile. Creating new ways of measuring performance; thinking and doing outside of the “traditional” box (Politis, 2004). For example, question 23 asks: on a scale of 1 to 7, how important is it to you that professors start to give credit to students for their creativeness rather than their correctness on exam essay questions and question 20 asks: how important is it to you that college helps you to develop new ways of thinking about old problems?

VI. Measures of Transactional Leadership Style.

In contrast with these concepts/factors that have been associated with “Transformational Leadership Style,” there are other factors that have a more traditional association with Transactional Leadership Style. For example, transactional leaders employ a strong degree of structure in order to reach their goals. In this study, a series of questions were created that were designed to assess some of the traditional beliefs underlying the education process. One of the traditional beliefs is that student performance is best measured by letter grades. Letter grades, in return, either serve as a positive reinforcement or as a punisher. The student will either modify his or her behavior or maintain similar behavior depending upon their mid-term grades. For example, there were 12 questions that dealt with student’s preoccupation with letter grades as opposed to the values of learning.

A. Grade Orientation.

There are 12 questions that were designed to assess a student’s orientation toward letter grades. For instance, questions 15 and 16 respectively ask: How important is it for you to earn a grade of B or better in a class? And, how important is it for you to learn from the class rather than what grade you earn in the class?

B. Instructor/Course Flexibility.

In addition to grade orientation, four questions were asked that dealt with course flexibility. The idea is that the student who is more oriented towards the Transactional Leadership Style will be opposed to professors who deviate from their course syllabus; even if it means bringing more relevant information into the actual course. An example of these questions is found in question 27 which asks: on a scale of 1 to 7, how much do you dislike it when a professor deviates from the syllabus in order to introduce additionally relevant information?

VII Procedure.

In an attempt to make sure that a reasonable cross-fertilization of participants was featured in the present study, various faculty members who teach either in the “traditional” program and/or the “nontraditional” program were approached to see if they would assist in administering the survey. Clear attempts were made by the researcher to approach some faculty members who are teaching primarily freshman level students in the traditional realm and freshman level students in the nontraditional realm. This process was repeated for each of the four levels of students (i.e., freshman, sophomore, junior, senior).

Each participant was given a copy of a consent form that clearly described the nature of the present study. Both the senior researcher and the participant signed a consent form before the survey was administered. The consent form was then placed in a separate envelope, sealed by the participant, and then placed in a separate box. The sealed envelope was signed with the corresponding year (i.e., 2007) in a manner that covered both the flap and the envelope itself. At the end of each testing session, consent forms were placed into a locked file cabinet.

Upon their accepting to participate in the study, each participant was seated in an area where no other participants could either observe their answers or communicate with them about the study. A researcher was present in the classroom throughout the testing session. The average time for completion of the survey was 27 minutes. After completing the survey, each participant was asked to place it in a sealed envelope and to write 2007 across the seal. Any survey that may show signs of being tampered with would be removed from the study. At the end of each testing session, a senior researcher would place the completed surveys into a locked cabinet.

VIII. Results.

The goal in this study was to discover which questions/variables featured in the survey would serve to form an identifiable and coherent subset of questions/variables that were independent of one another. Responses to particular questions featured in the survey that were correlated with one another but were mostly uncorrelated with other subsets of responses were combined into factors. The derived factors are believed to show the underlying processes that have created the shown correlations among variables (Tabachnick and Fidell, 2007).

In order to examine the structure of the PLSQ scale, several analytical methods were used. First, an exploratory factor analysis was utilized to determine if the factor structure of the set of items fit the proposed structure of the measure. Unfortunately, a sample size of 150 was not sufficient to adequately test the structure of 50 items, this would require between 500 and 1000 participants (Tabachnick and Fidel, 2001). Therefore, it was not surprising that the factor structure did not replicate the structure of the proposed measure. However, many items were reliable, as proposed. Confirmatory factor analysis using EQS 6.1 was also used to test whether the structure of the data fit the proposed structure.

In order to determine whether the items for each measure worked well together as a scale, confirmatory factor analysis was used separately for each scale to determine the fit of the model and which items did not fit with the scale. The CFI (confirmatory fit index) and the chi-square results are reported. The CFI indicate whether the data is a good fit to the proposed model. The CFI ranges from 0 to 1. CFIs larger than 0.70 are good, larger than 0.80 are very good, and larger than 0.90 are excellent. Ideally the chi-square test should not be significant, indicating that the structure of the data does not differ from the proposed structure. However, with datasets over

100 participants the chi-square is highly sensitive to slight deviations and often is significant even with a large CFI. Cronbach's alpha, a measure of internal consistency was also conducted for each scale, after examination by the confirmatory factor analysis. The final Cronbach alphas and CFI values for each scale are reported in table 4. First the transformational style measures were examined. The eight items for the charisma scale were an excellent fit for the data, CFI = 0.97, $\chi^2(20) = 23.29$, ns, Cronbach's alpha = 0.70. The seven items for the stimulation scale were a very good fit for the data, CFI = 0.82, $\chi^2(14) = 39.18$, $p < 0.001$, Cronbach's alpha = 0.70. The three items of the vision scale were too few to test with the confirmatory factor analysis so they were solely examined with the measure of internal consistency Cronbach's alpha = 0.50, which is lower than ideal. The thirteen items of the creativity scale had a good fit, CFI = 0.76, however, two items (9 and 30) did not load onto the factor. Once those two items were dropped, fit was improved, CFI = 0.85, $\chi^2(44) = 76.46$, $p < 0.01$, Cronbach's alpha = 0.81.

The two transactional style measures scales were examined next. The five items of the flexibility scale did not have a good fit, CFI = 0.57. Two items (13 and 14) did not load onto the factor so they were dropped. Unfortunately with only three items remaining confirmatory factor analysis was no longer appropriate so no CFI value is reported, however Cronbach's alpha = 0.72. Grade orientation did not have a good fit, CFI = 0.79. Seven items did not load onto the factor; however, four out of the six were highly correlated with each other and suggested a second dimension of grade orientation. Three items (16, 31 and 41) were dropped and items 46, 47, 48 and 49 were examined as a separate factor. The fit of the two factor structure had a better fit, CFI = 0.79, $\chi^2(26) = 36.42$, $p < 0.001$, Cronbach's alpha = 0.57 for the first factor of grade orientation and Cronbach's alpha = 0.82 for the second measure of grade orientation. A summary of the preceding analysis is shown in Table 1.

Table 1. Professorial Leadership Scale Questionnaire Psychometric Properties.

	Original Items	Final Items	Final Cronbach's Alpha	Final CFI
<i>Transformational Style Measures</i>				
Charisma	1, 2, 7, 11, 34, 38, 43, 50	1, 2, 7, 11, 34, 38, 43, 50	0.70	0.97
Stimulation	3, 4, 19, 22, 29, 35, 45	3, 4, 19, 22, 29, 35, 45	0.70	0.82
Vision	5, 8, 21	5, 8, 21	.050	N/A
Creativity	9, 10, 12, 17, 18, 20, 23, 30, 33, 39, 40, 42, 44	10, 12, 17, 18, 20, 23, 33, 39, 40, 42, 44	0.81	0.85
<i>Transactional Style Measures</i>				
Grade Orientation I	15, 16, 25, 31, 32, 36, 37, 41, 46, 47, 48, 49	15, 25, 32, 36, 37	0.57	0.79
Grade Orientation II	N/A	46, 47, 48, 49	0.82	0.79
Flexibility	13, 14, 26, 27, 28	26, 27, 28	0.72	0.57

The transformational leadership style measures were strongly correlated with each other. The correlations ranged from $r = 0.60$ to $r = 0.67$. These were all significant at the $p < 0.001$ level. On the other hand, among the transactional leadership style measures, flexibility was not

correlated with either measure of grade orientation; however, the two measures of grade orientation were strongly correlated with each other at $p < 0.001$, with a p value of 0.001

One of the critical questions raised in the present study was whether traditional students differed from nontraditional students on the set of four transformational leadership styles scales. None of the four scales differed by student type, (charisma: $t(144) = 0.92$, ns; stimulation: $t(144) = 1.18$, ns; vision: $t(144) = 0.31$, ns; creativity: $t(144) = 0.34$, ns).

A similar hypothesis was tested with a set of independent samples t-tests comparing traditional and nontraditional students on the set of three transactional leadership style measures. Only the t-test for grade orientation 2 was even marginally significant, with a p value of 0.054, $t(144) = 1.94$, $p < 0.10$. Traditional students ($M = 5.53$, $SD = 1.00$) reported a marginally higher level of grade orientation than nontraditional students ($M = 5.14$, $SD = 1.34$). Flexibility was not significantly different by student type, $t(144) = 0.70$, ns; and neither was grade orientation 1, $t(144) = 0.23$, ns. A summary of the independent samples t-tests is shown in table 2.

Table 2. Means by Type of Student for the Transformational and Transactional Scales.

	Type of student	N	Mean	Standard deviation	p- value
Charisma	Traditional	62	5.78	0.76	0.927
	Nontraditional	85	5.77	0.69	
Stimulation	Traditional	62	5.78	0.90	0.241
	Nontraditional	85	5.61	0.91	
Vision	Traditional	62	5.79	0.84	0.760
	Nontraditional	85	5.84	0.82	
Creativity	Traditional	62	5.47	0.80	0.737
	Nontraditional	85	5.42	0.80	
Flexibility	Traditional	61	4.77	1.37	0.485
	Nontraditional	85	4.60	1.49	
Grade Orientation 1	Traditional	61	4.83	0.68	0.815
	Nontraditional	85	4.80	0.63	
Grade Orientation 2 ⁺	Traditional	62	5.53	1.00	0.061
	Nontraditional	75	5.14	1.34	

⁺ $p < 0.10$

IX. Discussion.

One of the quintessential questions found within empirical research is what does null findings actually mean and of what value are they? In the present, it was hypothesized that traditional students would differ from nontraditional student in terms of the appreciation of professorial leadership styles. In light of the fact that this was one of the first studies to address this potentially important issue, there was little available research to guide the development of the actual hypotheses. As a result, the present study is best viewed as exploratory and thereby all hypotheses were meant to be non-directional or two-tailed hypotheses. We could not say which group would be more or less appreciative of which style; but instead, that a statistically significant difference may exists between the two groups.

As this research has shown, there was a high correlation between transformational scales and transactional scales. This is consistent with the previous research of Avolio et al. (1995, 1996) and Bass and Avolio (1997) who also found high correlations among the five transformational scales and the transactional scale of contingent reward.

According to Bass and Avolio (2000) these findings were anticipated because transformational and transactional leadership are active as well as positive forms of leadership styles. Data found in the present study supports this finding by indicating that participants endorsed transformational characteristics as well as transactional characteristics. These endorsement were unaffected by whether the student was termed traditional or nontraditional. All participants showed a preference for professors who may be charismatic, but yet held to the more traditional standards and beliefs about college instruction. We deem these null findings to be quite illuminating in that all students appear to endorse the idea of education being transforming, yet they still wanted to ensure that they made a good grade and the class was very structured. We believe that we our study demonstrates some of the complexities associated with professorial leadership style and students' academic performances.

A. Limitations of the Present Study.

There are a number of limitations found in the present study that would prohibit conclusive remarks about the saliency and clarity of its findings. First, each of the participants was rating in the abstract what they would or would not like in terms of professorial leadership styles. Ideally, participants would be randomly assigned to a number of professors who would either demonstrate a transformational learning environment or a transactional learning environment. However, before such laboratory studies can be conducted, one first has to have an instrument that does not feature high levels of multicollinearity. We propose to continue work on the PLSQ in order to identify questions that are even more reliable and cogent to this investigation.

The second limitation of the present study is that random selection of participants was not used. When random selection is not used, we recognize that any attempt to generalize beyond the 150 participants is obviated. In future studies, we have identified a method to have college students randomly selected from the overall student population.

The third limitation of the present study is tied directly to the PLSQ and the lack of an appropriate sample size. In future research on the actual PLSQ it is our specific goal to have sample sizes that are randomly selected and that are more than 500 in size.

In the present study, we did not address the cognitive underpinnings and theoretical findings relative to the evaluation and/or appreciation of some specific target. Our goal at this time was to simply develop a tool that would allow us to see if any differences existed along the leadership continuum that would differentiate traditional from nontraditional students.

B. Strengths of the Present Study.

Despite a number of caveats that appear in the present study, we have initiated an important line of investigation that we believe is critically important to understanding the many causally efficacious factors that impact college student academic performance. We propose to strengthen this line of research by incorporating personality measures as well as some of additional cognitive measures that will allow for greater illumination of how professorial leadership style impacts academic performance.

We may choose in future research to actually maximize the variance by looking at how traditional students between the ages of 17 and 24 differ from nontraditional students that are

above the age of 35. It could be that in the present study, much older students do differ from traditional students in terms of their appreciation and evaluation of professorial leadership styles.

In summary, it is believed that transformational leadership and transactional styles have a place in the classroom and both can help create a positive learning environment. It is the goal of our research team to continue to examine this important research area.

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An empirical study of personal response technology for improving attendance and learning in a large class

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Abstract: Student evaluations of a large General Psychology course indicate that students enjoy the class a great deal, yet attendance is low. An experiment was conducted to evaluate a personal response system as a solution. Attendance rose by 30% as compared to extra credit as an inducement, but was equivalent to offering pop quizzes. Performance on test items targeted by in-class questions rose by an average of 21% while control test questions rose by only 3%. The effect is seen in both factual and conceptual test items. Two theories that may explain the effect are discussed.

Key Words: Personal Response System, Classroom Technology, Clickers, Attendance, Test Performance, Learning, Methodology.

I. Introduction.

It's a problem familiar to many professors. Each semester my students wrote glowing reviews of my General Psychology course, rating the class a mean of 4.5 on a 5-point scale. In spite of the good reviews, large numbers were absent from class on any given day. This mismatch between students' perceptions and behaviors is most often found in large classes where attendance is not easily monitored and students are largely anonymous. Indeed, the problem became pronounced after my class size increased from 60 to 210 students. The student evaluations remained very positive but attendance was reduced to roughly 50-60% on any given day. Moreover, when students were in attendance many were inattentive, either dozing or otherwise occupied for at least part of the class period. In speaking with colleagues at campuses across the country, I found the problem to be common. The attendance and attention problem is directly related to learning because students aren't learning the classroom material if they aren't in class. I increased attendance to roughly 80% by giving pop quizzes throughout the semester. The system was cumbersome, however, as handing out and collecting tests from hundreds of students took a lot of time away from class. Grading them and inputting scores to grade books also proved time consuming.

I found a partial solution, however, in the use of a personal response system (PRS). PRS facilitates presentation of multiple-choice questions into any class equipped with a digital projection system. Because I was already using PowerPoint to present all my lecture material, the technology integrated naturally into my classroom. PRS requires students to purchase a remote (commonly called a "clicker") that allows them to "click in" responses, which are recorded by a receiver. Questions can be used to check comprehension or promote discussion. With the instructor's remote, a button click allows instant projection of class responses to provide

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immediate feedback. Uploading students' responses to a grade book also requires just a simple button click by the instructor.

PRS use in large classes has become very common nationwide but research on its learning effects is both sparse and inconclusive. Some investigations show positive effects of PRS on learning while others do not. As I will show in the following section, the underlying reason for differential findings may stem from methodological issues. For this reason, the present investigation focuses on the attendance and learning effects of PRS. It uses a methodology that offers a more fine-grained view of the learning effects in the hope of explaining and clarifying some of the literature's contradictory results.

A. Research on PRS Effectiveness.

PRS systems have been used for a variety of purposes including teaching case studies (Herried, 2006; Brickman, 2006), replicating published studies in class (Cleary, 2008) and electronic testing (Epstein, Lazarus, Calvano, Matthews, Hendel, Epstein and Brosvic, 2002). Based on published reports, however, the most common use appears to be during lectures for assessing students' comprehension of class material in real time and improving participation and attendance (Beekes, 2006; Poirier and Feldman, 2007; Shih, Rogers, Hart, Phillis and Lavoie, 2008). The latter function has also been the focus of more scrutiny.

A number of studies have attempted to test the effect of PRS on attendance and participation. Student volunteers using PRS in a controlled laboratory study were significantly more likely to participate than students asked to raise their hand or use laminated response cards to indicate responses to instructor questions (Stowell and Nelson, 2007). In a case study of PRS in a large introductory biology course, Ribbens (2007) reported an attendance increase of 20% after the technology was introduced in his course. PRS was also shown to enhance student participation in classes as part of an institution-wide evaluation across disciplines (Draper and Brown, 2004). One of the strongest effects of the technology in that study was its ability to promote class discussion among students. The increased participation may come, in part, from student enjoyment of the technology. Indeed, a common finding among PRS studies is that students enjoy the technology in class. For example, Hatch, Jensen and Moore (2005) report that 96% of students enrolled in their anatomy and environmental science courses agreed or strongly agreed that they liked using the technology. It is highly likely, though, that participation effects also stem from using PRS to determine required participation grades.

Not all reports have shown a clear improvement in student participation, however. Morling, McAuliffe, Cohen and DiLorenzo (2008) compared outcomes of 2 classes using PRS with 2 classes that were not. Two instructors each taught one PRS class and one no-PRS class. In the PRS classes, the technology was used at the start of each class to quiz students on assigned readings. They found that one instructor's PRS class rated attendance as more important than the no-PRS class, but ratings were comparable between the other instructor's classes. Neither PRS class reported being more engaged or attentive in class than their matched no-PRS class. It is important to note, however, that the PRS questions were scored for extra credit and not as a required component of the course. Moreover, PRS use in this study was limited to tests given at the start of class and only probed memory for the assigned reading, not for in-class material. There is no reason to expect that testing students about outside reading in the beginning of class would cause students to be more attentive or interested in lecture material during class. Indeed,

in a discussion of recommended best practices, Ribbens (2007) suggests integrating PRS throughout the class and using it as part of the graded requirements.

The learning benefit of PRS is another important issue that has been addressed in the empirical literature. In an assessment of students' self-perceptions of learning, Hatch et al. (2005) report that 92% of students indicated PRS helped them identify what they did and did not know and 83% indicated that the technology helped them learn. Of course, student's self-perceptions are not as accurate as more direct measures. In one study more directly measuring the effect, Ribbens (2007) found that students in his introductory biology course did 8% better on tests than his class 2 years prior, before adopting PRS. Morling et al. (2008) also reported higher mean test scores on 2 of 4 tests in their PRS classes than in their no-PRS classes. Morling et al.'s study is nicely controlled by its use of 4 classes counterbalanced between instructors and control groups. However, the authors do not mention how many of the test questions were directly related to the information targeted by the in-class PRS questions. The same question arises about Ribbens' (2007) findings. That information would be useful to understanding the extent of PRS effect on students' learning and understanding, as performance on questions not targeted by PRS may be diluting the dependent measure.

Other investigations have yielded somewhat mixed results in their analyses of learning with PRS. For example, Kennedy and Cutts (2007) found that the strength of the relationship between PRS use and learning outcome measures hinged on how successful students were in answering the PRS questions. Others have found no learning effects of PRS at all. Stowell and Nelson (2007) gave laboratory subjects a simulated introductory psychology lecture and compared test performance between groups asked to use PRS or do other sorts of participative activities during the lecture. They found no differences between groups on learning outcomes measures. Of course, the study was conducted in a laboratory so motivation to learn was different than in a live classroom.

In sum, the majority of studies on PRS point to the technology as an effective pedagogical tool and methodological issues appear to be a factor in those that do not. Specifically, assessments of PRS do not always assure internal validity through careful control of the relationship between in-class PRS use and the dependent measure. The hypothesis explored in the present study is that learning measures targeted at specific PRS questions will demonstrate a strong effect of the technology on learning. Before describing the study, the following section explains more about PRS and how it was incorporated into my classroom.

B. PRS Use in the Present Classroom.

My General Psychology class is typical of most, covering roughly one chapter of a textbook each week and spanning a cross section of the field. I use demonstrations, role-playing, audio, video, and interactive activities to demonstrate points. All of my lectures are presented with PowerPoint slides that are available on my website for students to download.

The system used in the present study was iClicker. The devices cost students \$20-35 (depending on whether it came bundled with a text or was bought used). The clickers were available at the campus bookstore or through Amazon.com. A receiver connected to the instructor's computer registers the responses. The iClicker company provides the instructor's hardware (a receiver and 2 instructor remotes) and software at no cost. The software runs concurrently with PowerPoint, with a small function box floating on top of the slides in a place of the user's choosing. It allows a bar graph of the class responses to be displayed

instantaneously. Record keeping is also automated, as students' scores are uploaded to a grade book within seconds or entered into a text only file that is transferred easily to an Excel file or Blackboard grade book. Questions can be ungraded, assigned participation points for entering any response or assigned points for correct responses only. Earned points can be factored into final grade calculations or used for extra credit.

In my class, I present roughly 50-70 credited, multiple choice questions over the course of the semester. The accumulated PRS points are scaled to a maximum score of 50 and calculated into the final grade as 50 out of a possible 350 points. Other questions, however, are not scored and are used solely to make a point or generate discussion. I typically present graded PRS questions after making an important point, explaining a theory or presenting a research finding, but only after soliciting questions and encouraging students to ask for clarifications. Some questions are factual (e.g., *What is the major difference between a punishment and a negative reinforcer?*) while others are more conceptual, requiring students to apply a principle (e.g., *Given what we know about the role of proximity and similarity in our attraction to others, in which setting are you least likely to meet a new friend or your future spouse?*). The PRS question slides are omitted from the download files I make available to students.

The purpose of incorporating PRS into the course this way was to improve attendance and to enhance student learning. The study presented here was conducted to evaluate the effectiveness of the approach. While the research summarized earlier was encouraging enough to try out PRS in my class, it also convinced me that evaluations of PRS are particularly sensitive to variables affecting external and internal validity. To maximize external validity, the study was conducted in a live classroom. To maximize internal validity, I focused on the relationship between the PRS questions and the assessment items during stimulus development. I also used control items and control groups from prior semesters. Specifically, the effect on learning was measured by pairing in-class PRS questions with specific test questions. Performance on the targeted test questions was compared with test questions that were not paired with PRS items. In addition, performance on the same test items in a prior semester that did not include PRS was used as a baseline measure. The methodology is explained in detail below.

II. Method.

A. Subjects.

Students enrolled in a 210-student General Psychology (PSY101) class at the University of Massachusetts Dartmouth during fall 2007 comprised the experimental group. All but a handful was traditional students, aged between 18-21. The majority, 81%, were freshmen, 14% sophomores, 4% juniors and 1% seniors. Because the course satisfies a university-wide distribution requirement as well as requirements within several majors, students came from all five campus colleges. 29% of the class was business majors, 23% nursing, and 40% liberal arts and sciences. The rest were distributed between engineering and visual and performing arts. Attendance and test scores of students registered in fall 2006, prior to the implementation of PRS, were used as baseline measures to evaluate the performance of the fall 2007 class. The majority were freshmen and sophomores, 84% and 14%, respectively. They represented all 5 colleges, with the bulk coming from business, nursing and social sciences/humanities, 43%, 16%, and 36%, respectively. One other attendance measure was used from a class in fall 2005. Students in that class were similar to the others in distribution of academic years (68% freshmen,

22% sophomores and the rest juniors and seniors) with most majoring in business, nursing and liberal arts and sciences, 21%, 3% and 58%, respectively. An IRB waiver was obtained prior to conducting the study.

B. Stimuli, Materials and Procedure.

The course taught to the PRS class was almost identical to the course taught to the No-PRS class, including the assigned text, all lectures and PowerPoint slides, projected with an Apple iBook G4. The difference was the addition of the PRS questions in the experimental semester. In all classes, the course material used for the study spanned half the material covered during the semester. This encompassed 6 chapters from the required text, covered on the second and fourth of 4 tests during the semester. A total of 30 test questions were targeted for analysis, five from each chapter. Of the 30 questions from each chapter, 18 were factual questions, asking about definitions, steps in a process, or other facts about the material. The other 12 questions were conceptual, requiring application of the factual material to given situations. Although students were not alerted to any relationship between the PRS items and the test questions, the relationship was the independent variable used to create 3 experimental and 2 control conditions. The test questions were chosen carefully in order match, as closely as possible, their relative degree of difficulty within each treatment condition. All PRS questions used for the study were factual, asking only about basic information presented in class.

The 5 test questions from each chapter were each used in one of the study's 5 conditions. Sample items are provided in the Appendix. The Identical condition presented a factual test item in class as a PRS question. The Reworded condition contained factual PRS and test questions on the same topic, but the items were not identical to one another. Both the questions and the response choices differed. The Conceptual condition included a factual PRS question in class that probed the information relevant to a targeted conceptual test question. Conceptual test questions required students to apply a principle or fact to a hypothetical situation. The Control-Factual and Control-Conceptual conditions, respectively, presented factual or conceptual questions on the tests but no in-class PRS questions relevant to their content. Six of each item type (one from each chapter) were included in the study.²

The classes all met three times per week (Monday, Wednesday and Friday) for 50 minutes at 11:00am. In fall 2007, the PRS items were spread across 7 weeks of a 15-week semester. The PRS questions appeared on slides as part of the PowerPoint presentations delivered in class each day. An average of 3-6 PRS questions were given in class each week with the items relevant to the study dispersed throughout the weeks in which the targeted chapters were discussed. As the instructor explained concepts or research findings, students were encouraged to ask questions or engage in discussion about the material. PRS questions were typically asked after a concept was presented and discussed, and only after students were encouraged to ask for clarifications or additional information. Some were asked as discussion starters and others for credit. A title at the top of a PRS slide indicated to students whether a given question was for credit or discussion. All PRS questions used in the present study were credited.

When the instructor activates the iClicker system with the remote (or keyboard) a timer appears on the screen, allowing a time limit to be set for responses. Typically, 60-90 seconds was

² Due to a test production error, one of the items in the Identical condition was left off the second exam. As such, the analyses for that condition are based on results from 5 items rather than 6.

allowed for factual questions. A bar graph showing the distribution of responses and the correct answer was displayed for another few seconds after the voting was “closed”. Students were encouraged to ask questions after seeing the graph and correct answer. If there was not high agreement (90% or greater) on the correct answer, another minute or so was spent discussing the item, whether students posed questions or not. On all but a few of the PRS items used in the study, however, students scored 90% or higher and asked no questions after seeing the correct answer.

The tests in this class were not cumulative, each covering only the assigned material since the previous test. Both tests analyzed for the present study included 50 multiple-choice questions. Each test included 9 experimental test items (3 items from each of the experimental conditions) and 6 control questions (3 in each of the control conditions). A total of 4 tests were given during the semester, but only tests 2 and 4 were targeted for analysis. Test 2 was given 6 weeks into the semester and test 4 was given on the last class day of the semester.

C. Analyses.

Attendance. Attendance data in the experimental semester were gathered from the iClicker data files, which maintains a record of the number of students submitting PRS responses per day. Those data were used to calculate the mean number of students in class each day over the semester. This figure was compared to prior fall semesters in which other incentives to attend class were offered. Attendance for those semesters was determined by calculating the mean number of papers handed in on days that papers were collected. In fall 2005 and 2006 the papers were for pop extra credit or pop quizzes, respectively, given roughly once per week in each semester. Both these classes were conducted in an identical fashion to the test semester, except that no PRS was used in either of those semesters. Only minor updates or changes were made in PowerPoint slides and lecture content, none of which would be expected to affect attendance.

Learning. The study was conducted in a live classroom so it was not possible to employ a fully controlled experimental design. Because questions couldn't be counterbalanced between PRS-paired and control conditions, item differences could be responsible for differences between conditions. Indeed, despite efforts to use items in each condition that were comparable in difficulty, there were differences between conditions in the baseline (No-PRS) semester in fall 2006. Because of these differences, directly comparing scores between conditions in the PRS semester would not be particularly informative. The analysis was conducted in such a way, however, so as to reduce error stemming from item differences. Specifically, since all the test questions used in this study appeared on tests given to the No-PRS class, the percent of the class getting each question correct in the No-PRS semester could be used as a baseline measure. This allowed condition comparisons on the basis of percent improvement over the baseline semester rather than raw scores. Thus, the analyses were conducted on the improvement scores to mitigate item differences as a potential source of error.

III. Results.

A. Effect of PRS on Attendance.

Attendance in the PRS class was equivalent to attendance in the pop quiz semester, 167 (80%) and 165 (79%), respectively. Average attendance in the extra credit semester was 128

students (61%). The attendance rate in the extra credit semester was significantly different from the other semesters, $\chi^2 = 9.36$ $p < .01$. The classes employing pop quizzes and PRS each had attendance rates roughly 30% higher than the class that offered pop extra credit as an attendance motivator. In real terms, when pop quizzes or PRS were used instead of pop extra credit, roughly 38 more students (18% of the class) on average came to class each day.

B. Effect of PRS on Learning.

Test items paired with PRS questions were correctly answered by 75% of the experimental class while only 62% of students in the No-PRS semester correctly answered the same questions. This is an increase of 20.9%. In contrast, an average of only 69% of students in the PRS semester correctly answered the control questions (those not paired with PRS questions), as compared to 67% of students in the No-PRS class. This is an improvement of only 2.9%. The difference in performance increase between PRS-paired and control items is statistically significant, $\chi^2(1) = 13.5$, $p < 0.001$

Additional analyses were conducted to examine the effect of the PRS questions separately on factual and conceptual test items. Figure 1 illustrates the data for the factual test questions. It shows the mean percent correct for each condition in the PRS and No-PRS semesters with the percent difference between classes printed over each set of bars. The PRS class improved significantly more on PRS-targeted factual test questions than on control-factual items $\chi^2(2) = 43.9$, $p < 0.001$.

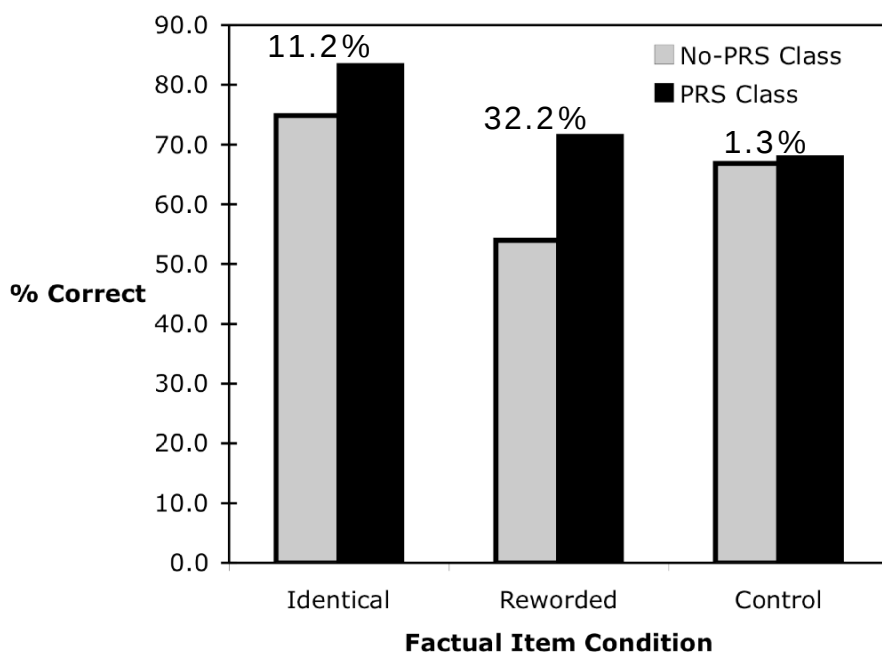


Figure 1. Relative performance on the factual test items in the PRS and No-PRS classes. The percent performance increase between classes in each condition is printed above each set of bars.

Figure 2 illustrates the results for the conceptual test questions. It shows the mean performance score for each class in the PRS-Paired and control conditions, with the percent

increase printed above the bars. The PRS class improved significantly more on conceptual PRS-targeted test questions than on control-conceptual questions, $\chi^2(1) = 11.7$ $p < 0.001$.

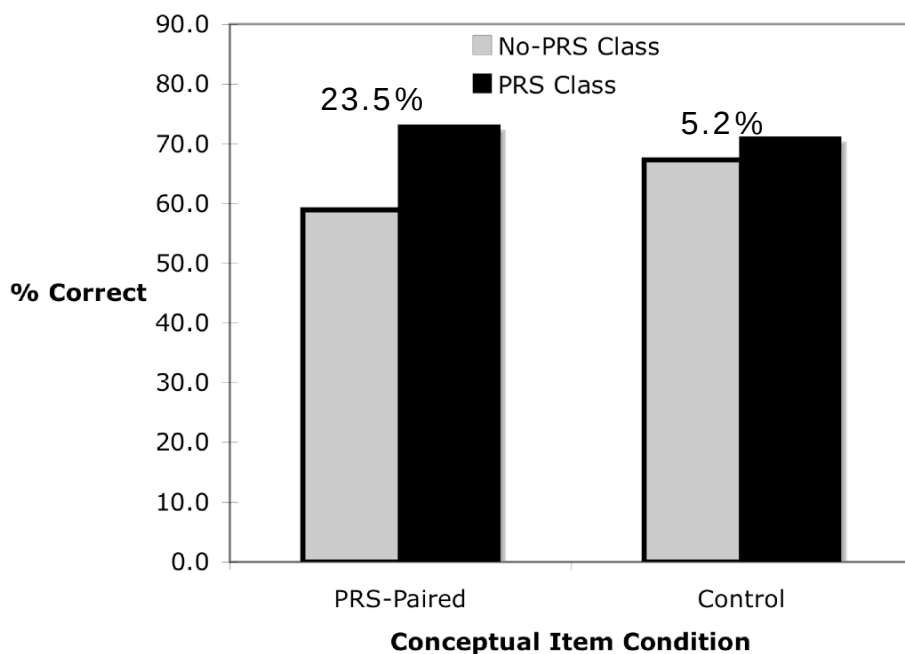


Figure 2. Relative performance on the conceptual test items in the PRS and No-PRS classes. The percent performance increase between classes in each condition is printed above each set of bars.

IV. Discussion.

PRS and paper-based pop quizzes both resulted in attendance rates of roughly 80%, which is 30% higher than attendance rates when paper-based extra credit opportunities were offered. In a class of just over 200 students, this translated to an average of 38 more students coming to class each day. Given that PRS did not enhance attendance more than paper-based pop quizzes, one may wonder if PRS is worth the effort. After all, there is no reason to believe that students indicating responses on paper would diminish the learning effects and PRS does require an initial time investment to learn the technology and create the question slides. However, the paper method requires the distribution, collection and grading of hundreds of papers each week. In contrast, PRS is simple to use and importing grades to grade books or files requires only a button click. Because of the large number of students the technology results in a net time saving, both in and outside of class.

The PRS effects, however, were more profound than attendance alone. Students' test performance demonstrated greater retention and comprehension of information targeted by PRS questions. In spite of the fact that the PRS questions were all factual, enhanced performance was observed for both factual and conceptual test questions. The effect can't be attributed to the attendance increase because (1) performance on control items increased significantly less than on target items and (2) attendance was comparable between the PRS class and the No-PRS class used as a baseline.

It is clear that the benefit of PRS does not transfer to information that is not explicitly addressed by the PRS questions. That is, the learning effects were observed only for test items that were matched with PRS items and not to the control items. This point is important for two reasons. First, several prior studies used overall test score as a measure of PRS effectiveness. In discussing those reports, I proposed that PRS effects may have been diluted because items not targeted by PRS were included in the dependent measure. The results reported here support that contention. Based on the isolated effects of PRS, I do suggest that future studies isolate PRS-targeted items as a dependent measure in order to get a clearer picture of the technology's effect. The second implication of this finding relates to pedagogy. Specifically, the result suggests that a sufficient number of PRS questions should be offered to have a meaningful effect on overall learning. Because the effects of PRS do not transfer to untargeted information the technology's value is limited unless it is used across topics. Fortunately, the technology allows a question to be asked, answered and scored in class within 60-90 seconds. Thus, the efficiency of the technology allows a number of questions to be asked each day, each targeting key lecture points as they are presented.

Another advantage of PRS over in-class, paper-based assessment is the instant feedback provided to students. Because the correct answer and class performance are projected instantly to the class, the instructor is able to reinforce comprehension or correct misconceptions immediately. Epstein et al. (2002) cite the immediate feedback function of PRS as one of the technology's major advantages. Indeed, not only are students able to learn by having their misconceptions addressed, but students who are inattentive in class and incorrectly answering questions may be motivated by seeing that their performance puts them in a small minority of the class. Again, it is certainly possible to offer questions in class each day and offer feedback once the papers are collected. The manual method, however, does not make the class performance on each item available to the instructor or students in the moment, when the material is fresh.

The magnitude of the effect reported here is greater than that in some other studies and this is likely due to two methodological factors. First, the present study carefully matched the PRS items to assessment items in the present study. As noted earlier, other studies have compared overall test performance between PRS and no-PRS classes (e.g., Morling et al., 2008; Ribbens, 2007) without isolating test questions that probed information addressed by the PRS questions. Since there is no reason to suspect that PRS use would affect retention of information unrelated to the material actually addressed by PRS questions, including those items may have diluted the effect. Indeed, the control items included in the present study demonstrate that PRS effects do not transfer to untargeted information. Another difference between the study and some others is that the present study took place in a live classroom rather than a laboratory and PRS performance was factored into final grades. As such, motivational differences exist between the present study and those conducted in a laboratory or offering PRS as extra credit. Students should be more strongly motivated to score well on PRS items and test questions when they directly affect their course grades.

While the present methodology has some advantage over laboratory studies, it is a concern that the experimenter taught the classes used for the present analyses. Experimenter bias is always a concern in research, so it is important that future investigations replicate the present study, thereby validating the results as well as the methodology. The quasi-experimental design also limits the strength of the conclusions. However, one would expect that uncontrolled variables between classes that could have affected test performance would largely affect control and PRS-paired items equally. Since the amount of change from the No-PRS semester was

markedly smaller for the control items than the PRS-paired items, the most likely source of the difference is the PRS questions.

Another potential criticism of the present study is that the PRS items may be effective simply because they provided test questions in advance. Indeed, had the present study shown only that students did better on test questions in the Identical condition than the control conditions, the results would be relatively mundane. After all, one would expect students to do better on test questions they had previewed in class. What is convincing about the results is that the Reworded and Conceptual test items also showed significant performance gains. In other words, asking students about a topic in class allowed them to better retain the information and score higher on items that had never before been encountered. That the effect held for novel factual and conceptual test questions is all the more compelling.

There are two competing theoretical explanations for the effect of PRS on learning. The first possibility is that the PRS questions merely highlight important ideas for students. In other words, asking questions about particular facts signals to students which topics the instructor views as important. As such, the effect may come about by prompting students to direct attentional resources to specific items during class and in subsequent study. The second possibility is that retrieval is acting as a source of memory encoding. Known as the *testing effect*, it has been shown that the act of recalling a piece of information can strengthen it in memory (Carrier and Pashler, 1992; Roediger and Karpicke, 2006). As such, it is possible that, by asking students to retrieve a piece of information in the moments just after encoding it, PRS questions help students solidify memory for the relevant information. A study currently underway attempts to find support for one of these explanations over the other. If the testing effect is the source of the PRS effect on test performance, it would mean that PRS technology offers a true learning advantage rather than mere study prompts. Such a result would be important to our understanding of both learning theory and pedagogical practice.

In spite of the positive results of the data reported here there are some reasonable concerns about implementing PRS and it is important to acknowledge them. Among those concerns is the initial time investment to learn and set up the system. If one is currently using no technology in the classroom, I suggest starting slowly by moving to electronic presentations such as PowerPoint before attempting a PRS system. There is an initial time investment to learn the software and understand how the receiver and software integrate with the computer, PowerPoint and grade books. Many campuses have already standardized on a system or at least have a number of instructors using a particular system. In this case, I do recommend taking advantage of campus computing services or inquiring with one's colleagues before getting started. Once comfortable with electronic presentations and the PRS software, adding PRS requires very little time or effort, as it requires only the addition of a few slides for each class. Questions can even be taken from test question banks provided by the text publisher. Once those items are created, they may be refined and others may be added each semester. Since the scoring and recording of grades is automatic, the initial time commitment to learn the software and create PRS slides should be recouped after the first semester of use.

Some may be concerned about technical difficulties and I have read reports describing technical challenges of working with PRS, including difficulty registering students, insufficient bandwidth, faulty remotes and other problems (Hatch et al., 2005). There are several excellent systems on the market today and there is no reason to suffer with a poor system. In my experience, the technology works with very little setup time or difficulty and is available for both Apple and PC platforms. The receiver supplied by the company has a range of 200 feet so the

size of the room should not be an issue in most cases. I do suggest conferring with computing support services and colleagues on one's campus for advice prior to adopting a system. If one's campus has standardized on a particular system it will be supported on campus and local help will be available to individual instructors. If one's campus does not offer technical help, I suggest choosing a system that comes with the promise of reliable technical support online or over the phone. Again, one's colleagues are a good source for such information.

Students do indeed have a cost associated with the system. They are required to purchase a remote just as they are required to purchase textbooks or pay lab fees in some classes. However, students are able to sell back their clickers to the campus bookstore, just as they do with their books. As PRS becomes more common, many universities are standardizing on single systems. Standardization is an excellent idea because it allows students to use their "clickers" across classes and years.

Students are also given added responsibilities when PRS is implemented in a course. They must register their clickers to get credit for their responses. With the system I adopted, registration takes just a minute or two per student. Students register simply by entering their name, student number and PRS serial number on a website.³ They are also required to come to class each day with their remotes and are given the responsibility to remember them. The PRS brand used in the present study, iClicker, does provide faculty with an extra remote and the ability to loan one to a student in class. With such a large class, however, I recommend a "zero tolerance" policy wherein a student gets no response credits on a given day if he or she comes unprepared. Otherwise, it will become a daily hassle to temporarily register the loaner remote and choose between multiple students asking to borrow it.

Faculty may be concerned about academic honesty with PRS. It is not possible for students to cheat by lending remotes to one another because a remote can only be registered to one person. However, just as there is no way to prevent all cheating on tests, there is some opportunity to cheat with PRS. A student skipping class could give his or her remote to a classmate to enter responses for him or her. I have made it clear that any student found with two remotes will be disciplined for cheating, as will the owner of the second remote. Nonetheless, I am quite sure I have not prevented this practice completely.

In spite of the cost and responsibilities passed on to students I am aware of no study that reports students disliking PRS in their courses. The present study did not assess student perception of the technology, but students' informal feedback was very positive. Moreover, other studies that explicitly asked students about their attitude toward the technology have reported positive responses from students (Hatch et al., 2005; Stowell and Nelson, 2007; Trees and Jackson, 2007).

In sum, the research presented here improves on prior methodology by studying PRS in a live classroom and by pairing assessment items with PRS questions. The data indicate that students benefit from PRS because they are motivated to attend class and learning outcomes are significantly improved. There is an initial time commitment to learn the software and create the PRS items. After that commitment is met, however, PRS gives instructors the ability to engage students, keep them motivated and focused, and enhance learning for little additional time and effort.

³ The instructor records the registration by creating a text file of student names and clicking a button on a screen in the software to "sync" the registration records with the roster. After that, all the responses are available to the instructor in a variety of formats.

Appendix 1. Examples of Stimuli and Test Items in the 3 Experimental and 2 Control Conditions. Test items in the control conditions were similar to those in the experimental factual and conceptual conditions but were not paired with any PRS questions on their respective topics. The study included 6 items for each condition, one from each chapter covered on the tests.

Identical

<u>PRS Item</u>	<u>Test Item</u>
The critical factor in the context effect is the influence of A. maintenance rehearsal. B. retroactive and proactive interference. C. external environmental cues in a particular situation. D. cryptomnesia.	The critical factor in the context effect is the influence of A. maintenance rehearsal. B. retroactive and proactive interference. C. external environmental cues in a particular situation. D. cryptomnesia.

Reworded

<u>PRS Item</u>	<u>Test Item</u>
Tolman found that rats that were first rewarded on the 11th day for finishing a maze did just as well on the 12th day as those who were rewarded every day. This result is important because: A. It tells us that reinforcement is always vitally important to learning B. It tells us that learning can happen without reinforcement C. Partial reinforcement is necessary for learning D. You can always tell how much a rat has learned by watching its behavior.	Psychologist Edward C. Tolman's studies with rats in mazes led him to conclude that: A. reinforcement is not necessary for learning to occur. B. learning will not occur in the absence of reinforcement. C. rats learn nothing more than a sequence of left and right turns. D. continuous reinforcement is necessary for operant conditioning to occur.

Conceptual

<u>PRS Item</u>	<u>Test Item</u>
A primary reinforcer is A. something we do not have to be taught to like. B. something that we find intrinsically rewarding. C. often related to food, safety or comfort. D. All of the above.	“I’ll make you a deal,” Leroy’s mother says. “If you clean up your room, then you can have a glazed donut.” Using operant conditioning terms, Leroy’s mother is using _____ to reward desired behavior. A. punishment by avoidance B. a conditioned reinforcer C. a primary reinforcer D. negative reinforcement.

Control-Factual

<u>PRS Item</u>	<u>Test Item</u>
None	Punishment is most effective if: A. it immediately precedes the operant. B. it consistently follows the operant. C. it occasionally follows the operant. D. there is considerable delay between the operant and the punishment.

Control-Conceptual

<u>PRS Item</u>	<u>Test Item</u>
None	Jonathan frequently plays the slot machines and sometimes comes out slightly ahead in his winnings. Like all gambling behavior, Jonathan's gambling behavior is on a _____ schedule of reinforcement. A. fixed-ratio B. fixed-interval C. variable-interval D. variable-ratio

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Implementing on-campus microteaching to elicit preservice teachers' reflection on teaching actions: Fresh perspective on an established practice

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Abstract: This article calls for renewed emphasis on the use of on-campus microteaching to facilitate simultaneously preservice teachers' performance of effective teaching skills and their capability to reflect meaningfully on their emergent teaching actions. In making a case for greater focus on the implementation of microteaching in preservice teacher preparation, the authors: (a) acknowledged the pioneering role of field-based experiences as the context for the studies that identified different types and levels of teacher reflection, (b) pointed out the limitations of field-based experiences for inculcating reflective teaching practices in neophytes, (c) described the characteristics of on-campus microteaching as a powerful tool for helping preservice teachers develop the skills of effective and reflective teaching, and (d) delineated the unique elements of promising practices of using on-campus microteaching to promote effective and reflective teaching.

Keywords: reflectivity, reflective practices, microteaching, educational experiences, teaching strategies.

I. Introduction.

Preparing effective and reflective teachers is a recurring theme in teacher education. A few instructional practices suggested as effective approaches for developing reflective abilities in preservice teachers include Socratic dialogue, action research, case studies, and journaling (Valli, 1997; Spalding and Wilson, 2002). Underlying the use of these reflectivity-inducing approaches is the recognition that extensive experience with real-life students in the natural classroom is the critical element in facilitating preservice teachers' reflectivity on teaching (Guyton and Byrd, 2000; Willard-Holt and Bottomley, 2000). For this reason also, the teacher preparation curriculum emphasizes various levels of what Cruickshank (cited in Brent, Wheatley, and Thomson, 1996) called *concrete real experiences* in preparing novice teachers to teach. It is commonly acknowledged in the field that through direct supervised classroom experiences, preservice teachers "develop their reflective and analytical skills, examine the relationship between theory and practice, and correct misinterpretations they might have about teaching" (Feyten and Kaywell, 1994. p. 52).

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II. Field-Based Experience as a Context for Studying Reflectivity Patterns.

Field-based experiences facilitate the development of reflective practice, hence several of the studies that delineated the characteristics of the different types or levels of novice teachers' reflectivity on teaching actions centered on teaching experiences in natural classrooms (Collier, 1999; Williard-Holt and Bottomley, 2000). These studies however did not preclude the fact that these placements are often fraught with teaching practices and educational mandates that might be adverse to the nurturing of critical reflection on teaching. Although field-based teaching experiences as the nexus for integrating theory and practice, and providing opportunities for preservice teachers to reflect on their teaching have been successful, these experiences according to Erdman (1983) have not always resulted in the attainment of these expectations. Erdman evoked Dewey's (1938/1998) differentiation of educative and miseducative experiences as follows:

The belief that all genuine education comes about through experience does not mean that all experiences are genuinely or equally educative. Experience and education cannot be directly equated to each other. For some experiences are miseducative. Any experience is miseducative that has the effect of arresting or distorting the growth of further experience. (p. 13)

This illustrates the paradoxical assessment of the importance of field-based experiences in teacher education. The typical field experience though perceived to be valuable, has the potential of perpetuating miseducative practices in the preservice teacher or educating the neophyte to comply unquestioningly with the status quo (Guyton and Byrd, 2000; Metcalf, Ronen Hammer, and Kahlich, 1996). Cruickshank et al. (1996) described a reflection-limiting effect of this compliant mindset also described as "impression management" on student teachers as follows:

While it [student teaching] has the necessary conditions to become a laboratory activity, it frequently is not, because student teachers are not truly viewed or treated as students of teaching involved in discovering, testing, reflecting, modifying, and so forth. Rather, too often student teaching is best characterized as learning to cook in someone else's kitchen, or modeling the "master". (pp. 29 – 30)

Preparing preservice teachers to teach effectively and to reflect on the sequence and consequences of their teaching actions is a prominent issue among teacher educators who must facilitate the integration of theory and practice through the proliferation of field-based experiences and the use of structured reflective thinking components such as journal writing and reflective interviews. It can be noted from the preceding that natural classrooms are not always the most accommodating settings for fostering novice teachers' reflection on their teaching actions. In order for reflectivity on teaching to succeed, it should be nurtured through microteaching in a supportive on-campus clinical setting (Pultorak, 1996). This is not to suggest that on-campus microteaching supplant field-based experiences as the vehicle for ensuring preservice teachers' development of reflective teaching. Rather, the purpose of this article is to assert that preservice teachers' reflectivity on teaching is a developmental process (Pultorak, 1996) that should be nurtured first, in a supportive on-campus clinical setting in anticipation of continuing implementation in off-campus field-based placements, and eventually throughout the span of a teaching career.

III. On-Campus Microteaching.

Microteaching was designed to provide a supportive environment for preservice teachers to practice teaching skills. Developed in the early 1960s at Stanford University, microteaching has evolved as the on-campus clinical experience method in “91% of teacher education programs” (Cruickshank et al. 1996, p. 105). At its inception, the goal of microteaching was simply to teach preservice teachers to emulate discrete skills modeled by instructors. The emphasis was on repetitive practice aimed at helping the neophyte attain eventual proficiency in executing several acquired latent skills simultaneously. The use of microteaching has currently shifted from the previous limited focus to encompass giving preservice teachers an all-inclusive teaching experience. Teaching whole lessons, albeit in a scaled-down form, has necessitated preservice teachers’ analysis of their teaching actions.

Two associated components critical in the implementation of microteaching are: videotaped microlessons, and feedback (Benton-Kupper, 2001; Butler, 2001). Working alone with an instructor or with peers in a microteaching group, a preservice teacher views the videotape of a mini-lesson for the purpose of analyzing and reflecting on the lesson as taught. Individual viewing of the videotaped lesson for the purpose of writing a critique of instructional performance is a practice aimed at encouraging the development of self-analysis and consequently, reflective practices. The other common element in microteaching is the provision of feedback either orally and/or in written forms. Led by an instructor or a trained supervisor, peers discuss each microteaching presentation, pointing out strengths and weaknesses of the lesson. Oral feedback is followed by written feedback on a microteaching review or feedback form developed for the purpose (Benton-Kupper, 2001; Butler, 2001). These characteristics of microteaching enhance the development of effective teaching skills and reflection on these emergent skills. Hence reflection on teaching actions has become closely associated with microteaching.

The merits of microteaching as a teaching strategy in teacher education can be described from three main viewpoints. First, there are the dual benefits for helping novice teachers practice teaching skills and reflect on their teaching actions. Second, there are studies that vindicate the practice by using microteaching to counter or reassess the effectiveness of other teacher education practice, and thirdly, are studies that compare the effectiveness of one variation of microteaching with another. The focus of the first category of studies was on the description of the organizational structure for effectively implementing microteaching activities. These studies often concluded with an affirmation of the benefits of the experience from preservice teachers’ perspectives (Brent, Wheatley, and Thomson, 1996; Benton-Kupper, 2001). An illustrative example of the descriptive emphasis is Butler’s (2001) examination of the change in preservice teachers’ thinking about effective teaching following two microteaching experiences. Butler (2001) reported that “participants were eager to talk about their microteaching opportunities and to comment on how beneficial the experience was and how much they had learned” (p. 266).

The second category of studies compared the effectiveness of microteaching with other teacher education instructional practices. Metcalf (1993) examined how a Teacher Education Laboratory designed to supplement portions of a field-based experience program with a 15-week sequence of integrated on-campus laboratory experiences affected preservice teachers’ behavior and understanding. Preservice teachers participated in several laboratory experiences including videotaped peer teaching and reflective teaching. The conclusion of this exploratory study was that the participants (28 preservice teachers) found both reflective teaching and microteaching to

be helpful experiences for acquiring and practicing professional skills. In a study that compared one microteaching practice with another, Kpanga (2001) examined the effect of videotaping of proceedings on preservice teaching performance in a teacher education setting and found that the experimental group that used the video recordings to guide discussion and critical analysis of microteaching showed significant improvement over the control group that did not use video recordings. The preceding studies validated the versatility of microteaching as a strategic process for helping preservice teachers attain the skills for teaching effectively and for performing critical analysis on their teaching.

IV. On-Campus Microteaching as a Tool for Reflection.

Considering that microteaching has the attributes to accommodate the development and enhancement of effective and reflective teachers, a paradigm shift in the discourse and practice of on-campus microteaching is imperative. Such a shift must examine patterns of reflectivity that preservice teachers display as they sequence and consider the consequences of their teaching. Though most of the descriptors of the various types and levels of novice teachers' reflectivity on teaching actions were derived from off-campus observation of full-blown lessons, it behooves teacher educators to be mindful of the benefits of on-campus microteaching for examining preservice teachers' reflectivity. While these descriptors have guided our thinking about the nuances of novice teachers' introspection on their teaching behaviors for a great while, the time has come for teacher educators to develop new and particular insights into preservice teachers' reflections on teaching actions in the unique context of on-campus microteaching. Unique in the sense that a) preservice teachers teach microlessons to their peers in a simulated environment, b) they receive prompt feedback from a university instructor and their peer-students, and c) through the use of video recording, they have the opportunity to watch their teaching performance privately or publicly with others. These instant and almost-instant feedback opportunities furnish preservice teachers meaningful content for reflection on their microteaching. The obvious question then is: What are some of the peculiar accoutrements that characterize preservice teachers' reflection on their teaching actions in on-campus microteaching experiences?

Author (2005) addressed this question in an interpretive analysis of the reflective outputs of 31 secondary education preservice teachers following the second session of two microteaching opportunities. The microteaching activities replicated the characteristics of the experience described above, namely scaled-down mini-lessons taught to small groups of peers in university classrooms, the use of videotape to record lesson presentations, and peer feedback written on a prepared form and communicated orally. At the end of the second microteaching experience, participants submitted a one to two page self-reflection based on personal perceptions of instructional performance, written feedback from peers, and information from video recording of the microlesson. Post-microteaching reflection was guided by three self-analysis queries: (a) What did I intend to do in this lesson? (b) What did I do? and (c) What would I do differently if I were to re-teach the lesson?

Articulating these queries within a framework of the sequential stages of reflectivity, i.e. describe, inform, confront, and reconstruct (Smyth, 1989), Author interpreted the recurring themes in participating preservice teachers' reflections on their micro lessons as follows:

1. Describe ... what did I intend to do in this lesson?
2. Inform ... what did I do?

3. Confront and Reconstruct ... what would I do differently if I were to teach the lesson again?

The recurring themes that emerged relative to the first two components of the framework showed that large numbers of participating preservice teachers attained describing and informing stages of reflectivity on their teaching actions with varying degrees of sophistication. However, with respect to confronting the consequences of their teaching actions and articulating specific accurate alternative actions for improving teaching performance, participants' reflective responses for the most part were unsatisfactory. For example, only 13 out of the 31 participating preservice teachers advanced to the expected affirmative and self-critique confronting stage that was a prerequisite for producing explicit reconstructing reflectivity on their lessons. The following representative statements are prototypes of the desired describing, informing, and confronting and reconstructing reflectivity respectively:

- o "I think the major goal I had for this lesson was to make sure each student understood how to solve a punnett square (b). Since I didn't have one biology major in the class, I knew it would be a successful lesson if each student could solve a punnett square on their own(c).... I wanted to go over some key definitions that would lay the foundations for the task analysis. With regards to the definitions, I wanted to make sure that they were easy to understand (d). I wanted the steps in the task analysis to be easy to understand (a). I wanted to make sure I got every student involved.... I also wanted to make a point to check for understanding. Lastly, I wanted to have a brilliant closing that would leave an impression on each of them."
- o "I started off the class by saying it was time for class to start.... I pointed to the warm up and read it to the class. They had to define totalitarianism.... I asked the students what they came up with for totalitarianism. At first, no one said anything. Then, one person said that it was something to do with government. Someone else said it was a dictatorship. Since no one else had anything else to say, I gave the actual definition....I went over each of the three critical attributes, explaining each one to the students.... I went over three examples and three nonexamples, explaining why each one fulfilled or did not fulfill the three critical attributes of totalitarianism.... Then I gave four more examples, having the students determine if they were examples or nonexamples of totalitarianism. After this, I asked the students if they had additional examples of totalitarianism. Two students came up with examples.... Then, I gave the closure...."
- o "If I could change the way I taught this lesson, I would bring with me some examples of inventions, either pictures or the actual invention itself. This is an idea that I received from the feedback sheets and I think it is a good one. I also experienced a little confusion about what a patent is. I needed to teach them the definition first instead of assuming that they knew what I was talking about when I made reference to the U.S. Patent Office.... At the end of the lesson I could have asked the students to help me sum up the main attributes of an invention to wrap up the lesson."

It was evident from the results of the study that merely providing opportunities for preservice teachers to participate in on-campus microteaching opportunities in a supportive, non-graded environment, and giving them specific prompts to elicit reflection did not always guarantee the expected outcome of deep introspection on teaching actions. Subsequently, it is equally important to mention that inquiry into the themes that defined the types and levels of participants' reflections was instructive in revealing the prevailing problems of their reluctance or inability to hold up their teaching to reflective scrutiny. The perpetuation of pedantic reflections on on-campus microteaching would consign the experience to a trivial exercise that is of no significant benefit to the developmental process of preparing effective reflective teachers. This is the reason why naming the types and categories that define preservice teachers' reflections on teaching is critical in the reconceptualization of on-campus microteaching as a tool for empowering preservice teachers to remake and self-correct their teaching actions. Post-microteaching reflection--a ubiquitous element of the experience--would therefore be educative to both preservice teachers and teacher educators.

The opportunity to reframe their implementation of emergent teaching skills, develop, and improve on a repertoire of teaching actions that work, gives neophytes control over their microteaching experience and thus enhances the value of the experiences. Through constant scrutiny of the typology of preservice teachers' reflections on their nascent teaching skills, teacher educators will be able to identify shortcomings in the development of effective and reflective teaching skills. Thus, on-campus microteaching coupled with critical analysis of preservice teachers' reflections on their teaching are imperative in attaining the important goal of preparing effective and reflective teachers.

V. Conclusion.

Teacher education programs seek to prepare effective and reflective teachers. Students who come through the programs have knowledge of teaching by vicarious means, having observed teachers for at least fourteen years and or 3,060 days (Kennedy, 1991). The acknowledgement of the interplay of prior knowledge and experience on acquired knowledge prompted Korthagen and Kessels (1999) to redirect teacher educators to deliberately combine the teaching of *episteme*, "knowledge that is based on research and ... characterized as ... theory with a big T" with *phronesis*, knowledge that is more "perceptual than conceptual" -- "theory with a small t" (p. 7). This suggestion presupposes that the dissemination of the knowledge of effective teaching skills to preservice teachers cannot become successfully internalized without teacher educators' attentiveness to the preconceptions that the new teachers have about teaching. Providing deliberate and structured opportunities for preservice teachers to reflect on the sequence and consequences of their emergent teaching actions is one strategy for uncovering and correcting erroneous preconceptions that might interfere with the execution of best practices in teaching. As alluded to earlier, such opportunities may not be realized in field-based experiences including student teaching. On-campus microteaching with its practice of scaled-down teaching, feedback and self-analysis, offers a unique context for grounding preservice teachers in the development of effective and reflective teaching. These characteristic attributes of microteaching appear to have been elusive for teacher educators because the emphases in microteaching seem skewed toward providing an opportunity for preservice teachers to practice teaching skills. Though reflection is an acknowledged element of the experience, preservice teachers' reflections on their teaching actions have largely been unexamined. Granted that preservice teachers will

reflect on their teaching when prompted, it is incumbent on teacher educators to examine the reflections generated from microteaching actions in order to discover recurring streams and patterns of reflection that would promote the development of best practice in teaching. Teaching teachers to use effective teaching skills and to reflect in a productive manner on their demonstrated teaching actions must proceed, metaphorically speaking, as two sides of the same coin.

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Supporting teacher education through a combined model of philosophical, collaborative and experiential learning

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Abstract: This paper provides insights into teaching and learning based on the analysis of an accredited professional development program, entitled the Postgraduate Certificate in Third Level Learning and Teaching, aimed at lecturing staff/faculty in Irish higher education. The program has its theoretical basis in the Kolb Experiential Learning Cycle (Kolb, 1983), combined with principles of collaborative learning and a philosophical understanding of teaching in higher education. An action research study was conducted to investigate the lecturers' perceptions of the program, with a particular focus on how support could be provided to them through a combined model of learning. As a core of the program is the importance of developing a personal philosophy of teaching, this was considered an integral aspect of the study. Philosophical perspectives are key to successful curriculum design in this context because values and beliefs affect the development of curriculum at various levels and it is important for program participants to be able to defend their own thinking and principles.

Keywords: Experiential learning; collaboration; curriculum design; philosophy of teaching; teacher education

I. Introduction.

This paper will report on the integration of collaborative learning within an experiential learning cycle of a Postgraduate Certificate Teacher Education program in Ireland and the program tutors' own learning as teacher educators and reflective practitioners in Irish higher education. An action research study was conducted to explore the lecturer's self perceptions of change on teaching practice (if any) by the program; a particular emphasis in the study is the development and support of a personal teaching philosophy.

The paper aims to focus on the learning experience of the participants of this program and explore if their teaching skills are continually improved through a combined process of reflection, development of awareness of current ideas about teaching, and peer collaboration. The context of this program is a continual improvement exercise on the part of the lecturer. It is hoped that this work engages in the scholarship of learning and teaching through involvement in an active investigation of effective learning and teaching practices, including critical analysis, evaluation, and communication of findings. This work is open to review and critique by peers and accessible for exchange and use by members of a scholarly community with the goal the improvement of student learning.

This study can contribute in a number of ways to the literature on learning and teaching in higher education. First, increased self-reflection by teachers in higher education settings can

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provide the basis for the continual refinement of an individual's instructional practices. Teachers, instructors, and professors are required to fulfil many roles and perform many duties that may be considered ancillary. At the core of the roles and duties is the actual practice of teaching and the primary purpose of this teaching practice is to facilitate and foster student learning. As a teacher, one should be willing to engage in the rigorous self-examination of one's own teaching philosophy, methodology, and effectiveness. Second, it can provide educational professionals (teacher educators) with a relatively clear understanding of the fundamental principles for effective instructional practice. Today, educational developers also perform many roles. During the last several decades, internationally, the transformation in the roles of teacher educators has paralleled the shift from inservice education focused primarily on individual teacher change to a more comprehensive, systemic focus on the entire organization and the individuals who comprise it. Today, teacher educators emphasize developing learning organizations and learning communities. The peer collaboration aspect of this study will be of interest in this respect.

The paper begins with an overview of the higher education context and rationale for the teacher education program. The review of the literature then concentrates on the importance of a philosophical basis for curriculum design. A subsequent section details the core of the study, by discussing the combined collaborative, experiential and philosophical model for teacher education. Finally, implications for pedagogy and practice are considered in the wider context of how this study can inform other related disciplines.

II. Context and Rationale for the Program.

The higher education system in Ireland is broad in scope and encompasses the university sector, the technological sector (Institutes of Technology), the colleges of education and private, independent colleges. The institutions, which fall within the first three groupings, are autonomous and self-governing, but substantially state funded. In comparison to faculty elsewhere, lecturers in Irish higher education are in the main equivalent to assistant professors.

Currently there is no professional training requirement for higher education lecturers in Ireland as far as their teaching is concerned. Thus, there are scores of unqualified teachers in third level (higher education) in Ireland, who are required to learn on the job, and thus, the program is offered to appropriate staff of both universities and institutes of technology. This is in line with the recommendations of the Colloquium on University Teaching and Learning held in Dublin in December 1998. Their recommendations included one which sought "*to facilitate further inter-institutional collaboration in development of a core curriculum for the professional development of staff*" (Colloquium, 1998, p. 20).

There is growing recognition within the sector for the need for training for lecturers and other academic staff/faculty who have a teaching component to their work. With the many demands on the time of today's lecturers, there are also recommendations for a progressive shift from formal, institution-bound teaching to technology-facilitated learning (Skilbeck, 2001).

The program at the heart of this study is located within a Faculty of Academic Affairs in an Institute of Technology. It has been in existence since 2000, and has currently over 180 successful graduates. Each year, program participants are drawn from very diverse fields and have spent varying lengths of time as lecturers. There are a range of participants, from newly appointed lecturing staff to the institution, to those that have been teaching for anywhere between 5-25 years. The teacher educator's experience of working with the participants is that this multi disciplinary setting provides for interesting and critical discourse about teaching and learning. In terms of their subject disciplines, there is an eclectic mix, with many fields being

represented in apprentice, undergraduate and postgraduate education: aeronautical engineering, architecture, art and design, bakery studies, biology, business studies, chemistry, economics, electrical engineering, fabrication and welding, fashion and textiles, film and media studies, fine art, graphic design, hotel and catering management, marketing, music, nurse tutoring, optometry, professional cookery, physics, science librarianship, social care, transport engineering, visual communication. Participants also include librarians, IT trainers and other academic support staff. Until 2007, all participants have been self-selecting and choose to come on the program. However, since that time, the institution in which the program is located has introduced a mandatory element for newly appointed lecturers, who have to undertake the program within the first two years of their position. This is a potentially future source of research on the program, as it may introduce a different dynamic to program motivation, participation and engagement.

There are a repertoire of teaching and feedback methods on the program. It is delivered via a series of interactive workshops, microteaching tutorials, peer observations and seminars and followed up by small group discussion sessions, both online and face-to-face with program colleagues. The focus is the preparation of educators in teacher education programs in colleges of education and includes a vision of these teachers as architects of new directions for today's higher education sector. It is important to encourage teaching that develops critical and independent thinking in its students and research that informs the teaching process and it is proposed that this program is an important step toward these goals. An overall goal of the program is that it acts as a catalyst within the various institutions represented, encouraging these lecturers to reflect on all aspects of learning and teaching provision, including curriculum design and assessment and to engage in dialogue with others in their departments about these areas. By spreading this on-the-ground enthusiasm, the goal is that the management of the institutes will support the full-scale implementation of good practice in these important areas in higher education teaching practice today.

The author is one of a team of four teacher educators (referred to as tutors in the paper) who have designed and who teach on the program. All were responsible for designing and moderating this course. Team teaching figures strongly in the moderation of the program because as a Centre for Learning and Teaching, we favoured teacher collaboration and collegiality, and it is an area that we wished to promote to the teachers who came on the program. We agreed that it was important to bring a variety of perspectives to the subject under consideration. All tutors are jointly responsible for course content and assessment. However, they take turns presenting material appropriate to their individual areas of specialization. Careful planning is essential, and this approach depends for its success on the compatibility and mutual respect of those involved.

It was anticipated by the design team that over time those who have completed this program would have a positive impact in higher education in Ireland by modelling good practices in teaching that enhance learning, and by generating increased interest and dialogue in teaching and learning within their own departments in their various higher education institutes. The challenge for those of us concerned to develop teaching in higher education is to firstly engage academics in conversations about teaching and learning. Rowland (2001) concludes from the experience of working with different groups of lecturers that they learn much from each other by drawing upon these differences and that the mixed grouping allows for practices and assumptions to be challenged by others from different backgrounds and this echoes our experience. Indeed Fullan (1993) maintains that a high quality teaching force, always learning, is the *sine qua non* of coping with dynamic complexity; there are no substitutes to having better teachers. This program is about making the career-long continuum of teacher learning a reality.

The program was designed with two core modules: 'Learning and Teaching in Higher Education' and 'Designing Curricula and Assessment Strategies'. Each module is of 15 weeks duration, and the participants meet for a face-to-face class session for three hours of each of these weeks; independent learning is fully encouraged outside of this schedule. The second module, which is the focus of this paper, is an introduction to curriculum design and assessment strategies. The aim of the module is to facilitate lecturers to take a competent active role in the development of high quality curricula in their own contexts.

III. Review of the Literature.

It is noted that making trans-national comparisons of teacher education is important. Consequently, a number of past and recent reviews of teacher education programs internationally is presented and discussed. A secondary focus of the literature reviewed in this paper is on higher education teaching philosophies and their relationship to curriculum design. This is because this relationship informed thinking and enlightened practice for the teaching team on the program; specifically about developing instructional repertoires, understanding curricular foci, gaining clearer perspectives as to what works with different types of learners, as well as developing an awareness as to the reasons why some methods work and others do not.

There have been a number of existing reviews of such programs, at over a decade apart (Carroll, 1980; Weiner and Lenze, 1997). However, it can be argued that these reviews provide a lack of evidence and lack of theoretical underpinning, and have not added sufficiently to the area. Rust (2000) reported lack of interest in researching the value of such programs. Since then, educational developers in Stockholm University have conducted recent empirical research into how first-level course participants, whose training in university pedagogy is compulsory, consider their teaching has changed since program completion (Adamson and Duhs, 2004). Their focus has been how they can extend the impact of their work to embrace more members of the university community, and how teachers can gain departmental support for innovative steps to improve student learning.

Similarly, the experiences of lecturers completing a teacher training certificate at South Bank University have been captured in research from its 1992 inception (Britton, 2004). This study raised some interesting issues in conducting such insider research; might respondents give "right answers" to please us? And what of the "problem of maintaining the balance between the level of detachment we would aspire to as researchers and the support we would wish to offer as educational developers" (McDowell, 1996, p.140).

Whilst acknowledging that this is an issue, it is argued here that such insider research is valuable because it draws on the experience of practitioners as complete members of their organizations and so makes a distinctive contribution to the development of insider knowledge about organizations and organizational change. An important message from Newton's research (2001) is that there are considerable merits in close-up study and insider research into 'views from below', and that there is scope for much wider application in a variety of higher education contexts and work environments.

A research study into initial teacher training programs in higher education at the University of Sussex used a model based on the work of Ho, Watkins and Kelly (2001) for assessing impact on a number of key areas: conceptions of teaching of course participants, impact on teaching practices, impact on student learning and impact on departments, and

exploring what happens to course participants when they return to the cultures of their home departments (Thew and Clayton, 2004).

This current Irish research can be placed in the context of a wider study by Gibbs and Coffey (2004) whose research looked at the impact of initial training programs such as this in 22 universities in eight countries, and support for teachers in researching the impact of changes (to assessment, teaching or other aspects of course design) on student learning processes and outcomes. Some of the findings of this study revealed that trained teachers rated better on all six scales of the instrument used, but that the type of course made no difference on impact. The conclusions of this study suggest currently that there is very little empirical evidence concerning the impact of educational development practice; it recommends that it is not impossible to obtain evidence of impact and such evidence can be quite influential when credible. It is with these conclusions in mind, that this current study in an Irish context may be considered.

More recently, Santhanam and Suri (2008) have also conducted research on a Graduate Certificate in Higher Education program delivered across campuses in Malaysia and South Africa, in addition to urban and regional campuses in Australia. Similarly, in Estonia, the training courses for university lecturers are designed to support their professional development, improve their teaching skills, and expand their professional competence (Remmik and Karm, 2008). Their research shows that some academic-development activities result in conceptual changes among academic staff (changes in thinking and practice along with changes in their approach to teaching and learning).

The research reported on in this paper does not extend to a consideration of actual measurement of impact of the course as it has been suggested that any consideration of ‘impact’ needs to question the various agendas and (sometimes competing) discourses which educational development has supported, or in which it finds itself caught up. The assessment of impact must take account of the distinctive cultures in which we work and the contexts of organisational change we have to negotiate (Gibbs *et al*, 2004). It is argued here that this will form part of a wider research study across learning and teaching in the institution.

However, it is suggested that this research in an Irish context has implications for other such programs delivered in the UK and further afield as it based on the premise that we need to analyse the pedagogical base for why we, as educational developers, do what we do – our underlying theories of learning and the rationales we offer for continuing, or changing, what we do. Ultimately, this research aims to address, for the learning and teaching centre involved, is its practice inherently valuable and who values it?

The philosophy of education can be considered an individual’s vision about the purpose and process of education. Understanding one’s philosophical orientation to teaching, provides one with a foundation from which decisions may be made regarding appropriate and important content and its subsequent instructional methods (Olivia, 2005). Carbone (1991) posits the term ‘teacher as philosopher’ due to the strong link between teachers’ values, curriculum design and implementation. Using a teaching philosophy to provide evidence of a teacher’s sincerely-held beliefs, codify pedagogical thinking at a particular time, examine teaching practices and monitoring one’s development as a teacher can all influence curriculum design.

The model of curriculum design for this program was chosen to support teachers in identifying ways to best create an environment that interests, challenges and enthuses their students while also ensuring, where possible, that what is learned is engaging and relevant. Teaching has been defined as the facilitation of student learning. Ramsden (2003) believes it embodies all that we do “to make student learning possible” (p. 7). This involves helping

students to become critical thinkers, to develop the inclination to critically evaluate the activities of the wider academic and general community, and to take responsibility for their own learning. Learning at a deeper level involves an awareness that accepted "knowledge" may be both fallible and ambiguous. Also necessary is the ability to communicate and work with others in the community, and the emotional resilience needed to work on an issue or problem for a period of time without necessarily reaching clear conclusions.

The rationale behind each participants' approach to learning and teaching, in essence, consists of how they conceptualise student learning, the values and beliefs they bring to their teaching and how these inform the programs they design and implement with their own students. Their philosophy may have been influenced by their reading or in discourse with colleagues, but primarily may stem from their own experiences. It is vital that participants consider how these experiences have shaped the way that they expose students to what they think it means to work in the discipline.

Students have knowledge, views and experiences to share that are valuable and worthy of consideration and opening up our classes to the voices of our students is sending a very powerful message to them as it is through talking with others, articulating their views and concerns that students are enabled to make sense of new information. The model has been influenced by the work of Vygotsky (1978) as it was important to give due recognition to the social dimension of learning and provide multiple opportunities for teachers on the program to develop understanding through the medium of discussion with peers and tutors.

The following section is a discussion of collaborative and experiential learning in the context of the program.

IV. Designing for Collaborative and Experiential Learning.

The module is designed to enable participants to creatively explore and utilise a range of ideas on designing curricula as well as to understand the use of different types of assessment. The involvement of students in a 'real life' curriculum project is the catalyst for student collaboration. Various philosophers and educators believe that experience is an essential element of learning and among that group is John Dewey one of the most influential educational theorists of the twentieth century. Dewey (1938) argued that there is an intimate and necessary relation between the processes of actual experience and education. For Dewey the type and quality of the experience was fundamentally important and he advocated a purposeful and holistic experience developed with forethought and planning. Vygotsky's work is emphasised in the program by placing an emphasis on activity as the basis for learning and for the development of thinking alongside strong emphasis on the role of communication and social interaction and the importance of cooperatively achieved success.

The design focus was on the importance of fully integrating the curriculum design process within the experiential model of learning on which the program was moulded, taking full account of the program aims and learning outcomes, assessment strategy and issues of participant motivation. However, it was important to create a learning environment where the participants would learn in community and the enquiry based curriculum project brief was designed taking cognizance of this and the participants were assigned to groups to complete the task. The process of generating a program framework document was an empowering if at times painful experience for the groups. The enquiry based collaborative project replaced the

competition between individuals for knowledge with a pedagogy that placed emphasis on knowing and learning as communal acts requiring many voices and experiences.

The competitive individualism of the classroom is not simply the function of a social ethic; it reflects a pedagogy that stresses the individual as the prime agent of knowing. But to say the obvious, knowing and learning are communal acts. They require many eyes and ears, many observations and experiences. They require a continuous cycle of discussion, disagreement and consensus over what has been seen and what it all means. This is the essence of the 'community of scholars' and it should be the essence of the classroom as well (Palmer, 1997, p.204).

There was a desire to create a space for these lecturers to think, to question, to learn together through dialogue and discussion and hopefully to experience the kind of professional learning which Walker (2001) describes so eloquently.

The 'space' of collaboration provided the safe space for dialogue and development, and our shared commitments to student learning held it all together (p.38).

It was sought to incorporate principles of group learning into the program. In dividing the class into groups, consideration was given to the optimal group size and decided on groups of seven as in smaller groups there is a greater likelihood of trust, close relationships and consonance of aims (Jacques, 2000). The task specified for the group was topical and relevant and the curriculum project represented one module of participant work. A tutor was attached to each project group but each participant was expected to work as a collaborative partner within his/her group facing the learning issues together and sharing the decision-making. There would be time allocated each week for the group to discuss and progress their curriculum brief and the group-work was to be seen as a coherent mode of learning in its own right and not seen in isolation from the rest of the curriculum or its associated culture.

As facilitators it was evident that the group learning provided an environment where creative strengths and attitudes emerged during discussion as part of a collective effort. It was interesting to watch in the sessions as individuals offered ideas and half formed concepts to the group and the group shaped these ideas and concepts to arrive at a collective understanding and a higher conceptual level than might be possible in an individual project.

The design and implementation of this program for academic staff/faculty has fully integrated a range of learning experiences in teacher education and the learning has been stimulated and delivered by tutors with an academic background in teacher education themselves. The program was modelled on Kolb's Experiential Model of Learning which encompasses learning methods based on the experience of the learner.

We were convinced that it is important to draw upon the learners' prior experience and to provide opportunities for them to be actively in what they were learning. We also agreed, however, that experience alone is not the key to learning (Boud *et al*, 1985).

Relevance and application of learning are important features and reflection is fundamental to the process. As the program was designed to support the learning and teaching process at third level, some considerable time was spent looking at the best national and international practice in the area. It was considered important to introduce to the program creative approaches to curriculum design, alongside common instructional and curriculum design models in use in higher education today. The participant's own attitudes and experience of curriculum design were a vital facet to these discussions. Dialogue in the project groups included the participants' experiences of designing for interactivity, assessment and evaluation. Underpinning all of this were explorations of emergent philosophical issues.

There was flexibility to allow participants to have part-ownership of the curriculum group process and product. They were given an opportunity to discuss and input into how the group project would be formatively and summatively assessed. The rationale for this was to enable them to have a part to play in the choosing of roles, or the intended outcomes of the project. Extensive tutor and technical support of the group work process was provided. The participants have formal contact with the tutor at different stages of the project. This takes the form of group tutorials, and, if requested, meetings with other participant groups. This contact is to help to avoid or sort out problems in the group dynamic while the group work is being carried out.

An interdisciplinary focus was important in the collaboration. The program team took the initiative to make connections with other departments within the institute and elsewhere in the higher education community in Ireland. Visiting experts in the area were invited into the program to discuss their views with the participants and tutors.

V. A Model of Collaborative and Experiential Learning.

The conceptual model that underpins this postgraduate teacher education program reflects the philosophical foundations of the profession. Experiential learning theory defines learning as "as a process of conflict confrontation and resolution among four basic adaptive modes or ways of relating to the world." (Kolb and Fry, 1975, p.37). Kolb and Fry (1975) argue that the learning cycle can begin at any one of the four points - and that it should really be approached as a continuous spiral. However, it is suggested that the learning process often begins with a person carrying out a particular action and then seeing the effect of the action in this situation. Mezirow (1991), Freire (1985) and others stressed that the heart of all learning lies in the way we process experience, in particular, our critical reflection of experience. They spoke of learning as a cycle that begins with experience, continues with reflection and later leads to action, which itself becomes a concrete experience for reflection. This theory suggests that the learning process often begins with a person carrying out a particular action and then seeing the effect of the action in this situation. In defining the cognitive processes of learning, at over twenty years old, this theory, whilst not without its critics (Rogers, 1996), remains popular as it has helped move educational thought from the locus of the instructor back to the learner.

Figure 1 presents a schematic diagram of the curriculum model. Included in the diagram are the key program features: participants' defining attitudes, beliefs, and approaches as teachers and a cycle of experiential and collaborative learning.

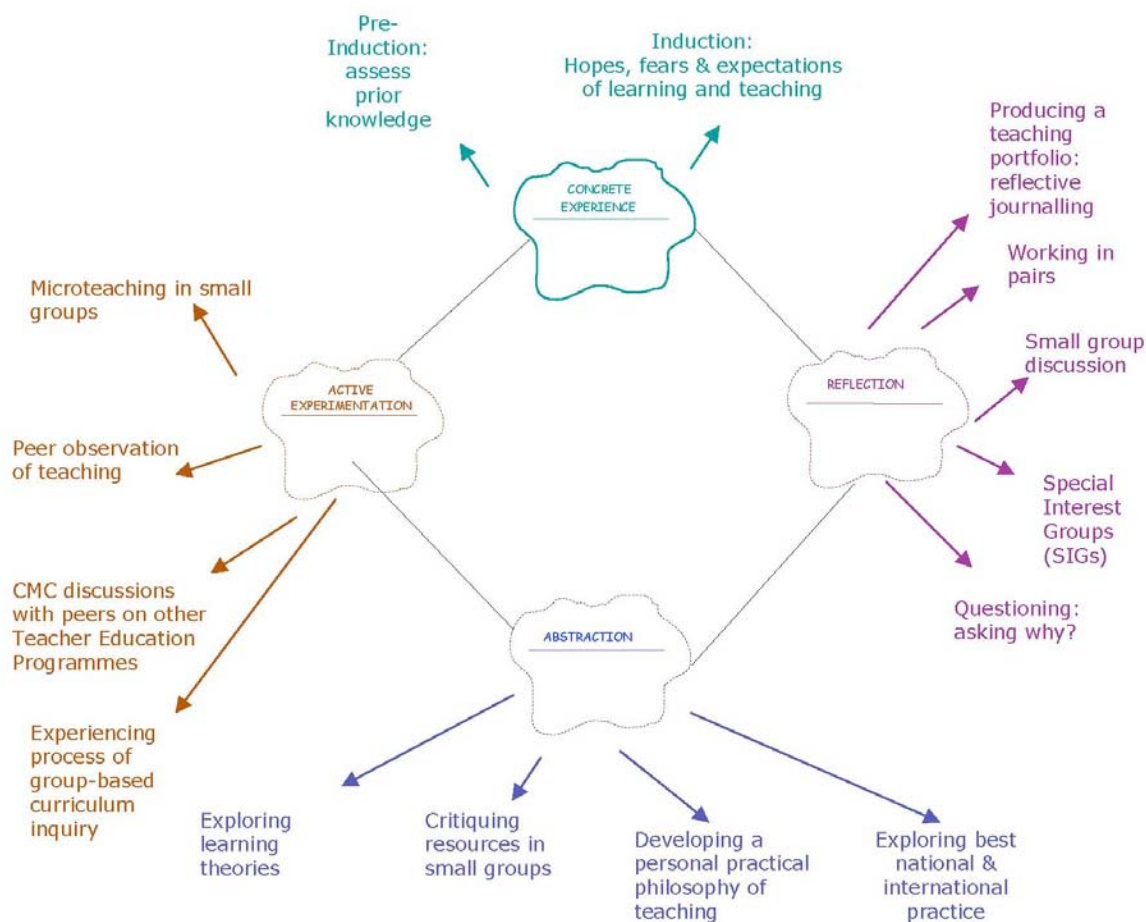


Figure 1. Philosophical, Collaborative and Experiential Learning in the Context of the Programme.

Each of the four stages of Kolb's experiential learning cycle are considered along with the components of the program designed to facilitate the learning; they are presenting using colour coding: concrete experience (green); reflection (purple); abstraction (blue); active experimentation (brown). The model depicted in Figure 1 is now discussed below.

A. Concrete Experience.

The learning in this Postgraduate Teacher Education program begins with the real experience of the lecturers in their role as teachers and facilitators of learning in their institutions. The participants' concrete experience of using curriculum design needed to be taken into account, and the facilitated inputs by the tutors then restructured around the participants. Tutors were aware of the participants current knowledge of curriculum design through a process of discussion in group tutorials.

Early on in the program, there was time given for discussion of issues relating to the structure, objectives, content and delivery of third level education, and also issues relating to the

appropriate background for teachers delivering instruction in this area. It is known from psychology that students learn best when motivated by interest and empowered by knowledge they take on a conceptual challenge to solve a problem or accomplish a task that is just out of their reach. Equipped with meta-cognitive skills, they set goals and work with human and informational resources to assess their progress towards the completion of the task. Once completed, the learner is eager to share this new knowledge with others. This is how the participants chose to work on the curriculum project. Such collaboration made it easier to facilitate collective sense-making round the curriculum design task.

B. Reflection.

The participants were facilitated to reflect on their experiences of curriculum and through the group-based enquiry project; throughout links were made to the theories and principles of curriculum design. If critical reflection is to occur, it is important to cultivate the relationship between teacher and students and among students themselves. One of the main features of self-reflection is for individuals to have the freedom to make a choice for themselves rather than to have to conform to the influence of the tutor or other students and so the structure of the group must allow equal power relationships between group members. The idea was for them to be able to confirm their strengths, raise questions, improve their practice and innovate. This reflection took many forms including, individual and group exercises, but the reflection step of the Kolb Cycle also concentrated on the participants working in pairs, taking part in group discussions, and the setting up and maintaining of special interest groups in key areas of curriculum design such as designing for key skills and integrating learning technologies into the curriculum. Throughout, they were actively encouraged to reflect on any innovations they were attempting for the first time, especially if it did not go according to plan; if problems arose, they questioned it and reflected on what went wrong and why, in order to try again. Reflective journaling as part of the production of a teaching portfolio was a significant feature of the program. Dewey (1933) defined reflective thought as “active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (p.118). Building upon this, Boud *et al.* (1985) address the need for participants in a program such as this to return to experience, attend to (or connect with) feelings and evaluate experience - this latter point involves re-examining experience in the light of one’s intent and existing knowledge. It also involves integrating this new knowledge into one’s conceptual framework.

C. Abstraction and a Philosophical Underpinning.

The generalisation and abstraction took many forms including exploring the academic literature on curriculum design in higher education, investigating best national and international practice in order to benchmark their work, critiquing resources, exploring learning theories and developing both a personal and collective practical philosophy of teaching. The participants were encouraged to ask questions about the theories of learning and teaching from the viewpoint of their current practice. They also theorised from reflections on their own teaching practice.

As part of the abstraction step to the Kolb Cycle, several other key themes in curriculum were integrated to the group project. The themes of equity in higher education, and the psychology of learning, were explored by all the groups, and there was a sense of them

contributing and sharing papers between groups that they found interesting and relevant. Throughout the duration of the program, the participants themselves can be called upon to present case studies unique to their subject area. Several of these can be directly related to the creative design of a new third level curricula, including aspects of the participant's practice that was innovatory for them. There is an outlook on the program that much that can be learned about learning and teaching will come from fellow participants rather than solely through the conduit of the tutors; and this outlook is endorsed by the tutors themselves. Dissemination of all program materials, including the case studies is encouraged at all times. This can be a dynamic resource and the participants will be strongly encouraged to continue its use.

D. Active Experimentation.

Active experimentation was a major key to the learning in this module. Participants were invited to explore different ideas and methods in the preparation of the program framework document they were required to produce.

Microteaching was developed in the early and mid 1960's at the Stanford Teacher Education Program. It is used in this program as it offers a concentrated, focused form of peer feedback and discussion. The essence of each micro lesson is an opportunity to present a sample "snapshot" of what/how each participant teaches and to obtain feedback from peers in a small group about how it was received. It is a chance to try teaching strategies that the participant may not use regularly. This is a safe time to experiment with something new to them or to get feedback on a technique they have been trying but are not sure about its effectiveness.

The process of peer observation on the program involves peers that review a teacher's performance through classroom observation and exploration of instructional materials and course design. Observations of classroom behaviour are intended for reviewing the teaching process and its possible relationship to learning. The focus is on verbal and nonverbal behaviors of both the teacher and the students in the classroom.

Computer Mediated Communication (CMC) software was discussed and demonstrated prior to the module beginning. This was very useful for providing real-time or time-independent communication amongst the group members and staff within and between institutions. Participants were encouraged to set up online discussion boards to be used as a forum to discuss their module group projects at each project milestone. The participants in the groups were all located at different campuses and the CMC software gave them an opportunity to continue their group work at times when it was not convenient to meet up face to face. This was important as the Web is now causing educators to re-think the very nature of teaching and learning. Claims have been made that the Web can free teaching and learning from the physical boundaries of classrooms and time restraints of class schedules. Learning resources of the college and other institutions can be augmented by learning resources of the world via the Web. Overall, the web-based instruction enables greater individualisation and flexibility for participants whilst also creating an increased demand for self-directed learning, and offering the potential to support collaborative learning.

Learning in this stage takes an active form - experimenting with, influencing or changing situations. You would take a practical approach and be concerned with what really works... (Kolb, 1983, p.4)

VI. Participatory Action Research Study.

The research has extended over a period extending from 2005-2006. An interpretivist, participative approach was adopted for the study. A participatory action research approach would assist in enhancing the understanding of the module context both for myself, as module tutor, and the participants. The phenomenological meaningfulness of lived experience, people's interpretations and sense making of their experiences in a given context constitutes an appropriate and legitimate focus for social inquiry (Greene, 2007). Understanding meaning as the goal of interpretivist inquiry is not a matter of manipulation and control, particularly with respect to method; it is rather a question of openness and dialogue. Central to this study was the concept of learning and working with other people, therefore it was important to concentrate on eliciting the reality of the participant experience on this module. When change is a desired outcome of the research, as it was in this study, some participative form of action research is often indicated. In this study, 'participative' is interpreted as a partnership between the teacher as researcher and the academic staff/faculty as participants.

Participatory action research was chosen ultimately as the methodology for this work, because the issues that had emerged from past evaluations of the module were very important both to the researcher and tutors on the module, and equally important for the academic staff/faculty who participated in the module. This form of action research is research *with* rather than *on* other people. It was explained to the participants how it was hoped to improve the educational situation for them in the module *here and now*. The intention was to create a structure for partnership between the researcher and the group currently undertaking the module. This would help to increase the honesty with which the group members reported information as it was to their benefit to have accurate information on which to make changes. The acquisition of specialised and detailed information from participants would provide a basis for analysis and elucidatory comment on the topic of enquiry. A process of concurrent analysis involved data transformation from the raw state to a form that allowed them to be used constructively to make changes as the module progressed and, ultimately, to re-design the module.

A. Research Design and Methods.

Data were collected through questionnaires and focus groups in the time frame 2005-2006. Each method was chosen for the opportunity it could offer to capture the participant's own thoughts and experiences of the combined approach taken to the program delivery which was central to this study. With a focus on the participants' experience of the module, it seemed clear that the study could either be based on observation or interrogation of the participants, or a combination thereof. Creswell (1998) has advocated that the backbone of good qualitative research is extensive data collection typically from multiple sources of information.

The three methods of collecting data for this study (qualitative questionnaires, focus group interviews and textual analysis of the tutor's reflective journal) were continuously complemented by prolonged immersion in the literatures of the field. Figure 2 provides an outline of the research design for the study involving four different phases of planning for the data collection, actions inherent in the collection of relevant data, analysis of data and making recommendations.

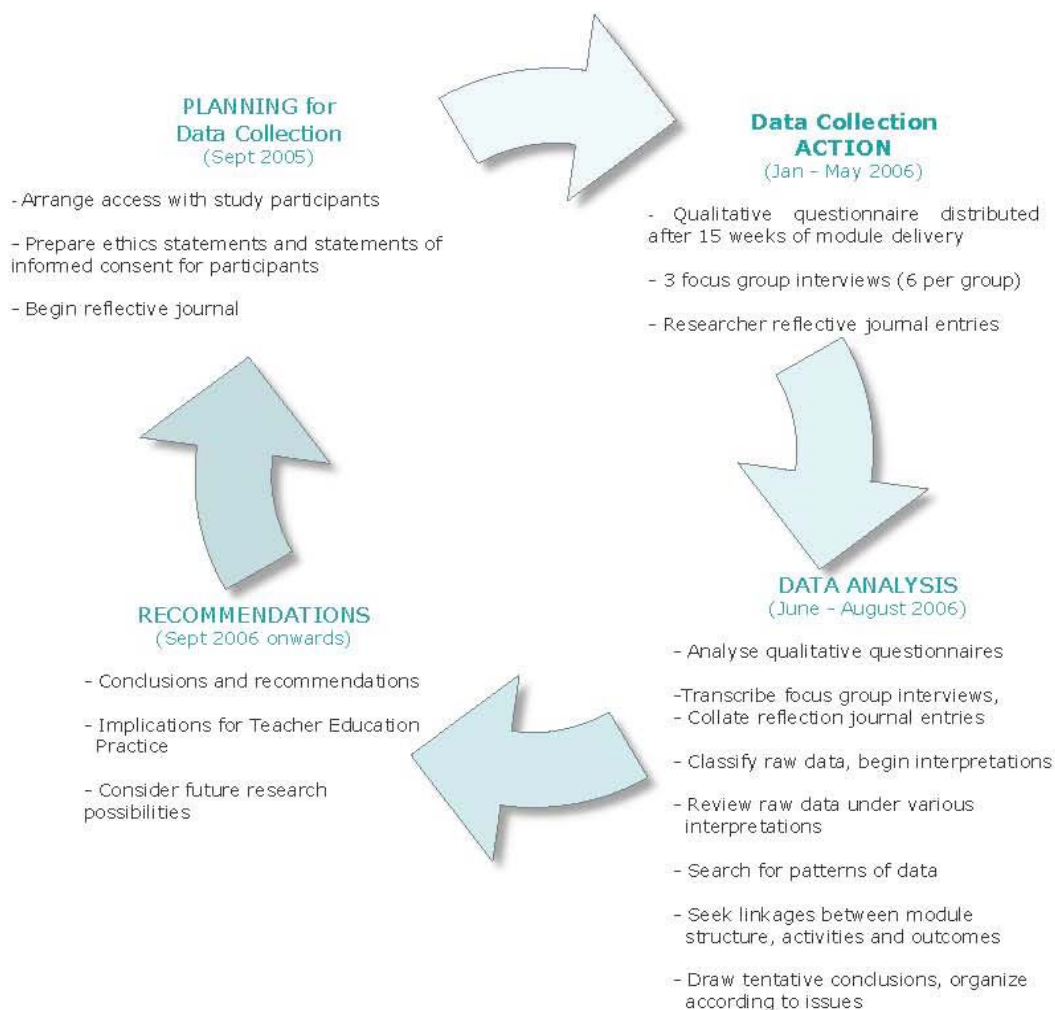


Figure 2. Different Phases of the Study.

A qualitative questionnaire was presented to 60 participants in the final week of the module over the period in the academic year 2005-2006. Participants were drawn from a number of disciplines: social science, business, chemistry and the apprenticeship fields. Three semi-structured focus group interviews were then held one week after the module ended in May 2006, with six participants in each group interview. Focus group interviews are a form of evaluation in which groups of people are assembled to discuss potential changes or shared impressions (Rubin and Rubin, 1995). As a general rule, focus groups are an appropriate research vehicle when the goal of the investigation is to gain an understanding of the why behind an attitude or behaviour (Greenbaum, 2000). The focus group discussion was structured on three areas: the improvement of practice (through the curriculum design focus of the module), the improvement of understanding (through experiential and collaborative learning on the module), and the improvement of the situation in which the action takes place (based upon the philosophical focus of the module).

In each of the three focus group interviews, the researcher adopted the role of moderator, facilitating initial discussions among the group participants and introduced the topics to be discussed. The aim was to be non-directive, allowing the group discussion to develop its own dynamic and pursue topics as they arose and captured the interest of the group. Stewart *et al.* (2007) suggest that the moderator is often quite nondirective with respect to the discussion, letting it flow naturally as long as it remains on the topic of interest. However, it was important to recognize that the amount of direction provided by the moderator does influence the types and quality of the data obtained. The moderator took on a non-directive stance in the focus group interviews in the sense of not having to probe for more information on a given topic as the participants often stimulated one another's responses and even posed questions to one another. There were times when it was important to encourage the participants to shift positions from their role on the module as learners to their professional role as educators, in order to explore alternative perspectives, contradictions and ambivalences, where they occurred. The idea of shifting positions was important to show how the individual participant could hold different ways of interpreting their experience on program. Investigating questions in the focus group interviews provided rich, or as Geertz (1973) termed it 'thick', detailed data which was valuable to complement what was obtained from the responses emanating from the qualitative questionnaires. Charmaz (1995) believes "rich data reveals thoughts, feelings and actions as well as context and structure...affording the researcher a thorough knowledge of the empirical world or problem that is being studied" (p.33).

As moderator, I was mindful throughout the focus group interviews that the participants may not have heard the question through the same meaning-frame as myself and indeed in some instances, this was found to be the case. They may also not have known why they experienced things in the way that they did. The moderator's task was to elicit information that illuminated an understanding of the research topic without shutting down useful information by bluntly asking those questions. So open questions were used to invite the participants to be receptive and expansive and to make associations between different experiences on the module and where possible, avoided questions that elicited *yes* or *no* answers. There was also an intention to avoid straightforward *why* questions because as Hollway and Jefferson (2000) pointed out, "they can invite intellectualisations or rationalizations of problems and are often uninformative in terms of the research questions" (p.26). In a study by Ryan *et al.* (2004) on how adult education tutors facilitated transformative learning in the classroom, it was concluded that the low quality of data collected from focus group interviews was due to the asking of too many *why* questions on too many occasions and the researchers did not ask for enough stories and critical incidents which would have most illuminated the research objectives.

There was a certain amount of difficulty in trying to direct the discussion to topics relevant to the research without disrupting the social dynamics of the group. Although having said this, the value of free association (apparently illogical connections) that some of the participants seemed to favour was useful. Glaser and Strauss (1967) have suggested that the researcher needs to continue gathering information until reaching the saturation point, where newly collected data is redundant. Lincoln and Guba (1985) put it this way: "the criterion invoked to determine when to stop sampling is informational redundancy, not a statistical confidence level" (p.203).

Albrecht *et al.* (1993) suggest that criticisms of this method centre on the nature of the interaction and how it affects what people say within a group, as opposed to what they say in individual interviews. An illustration of this is the group creating consensus to the extent that it

prevents individuals from saying things they might say in a one-on-one interview. To overcome this, the moderator stressed that a range of different responses to given situations on the program was welcomed. By adopting a reflexive perspective in this participatory action research study, the researcher accepted the challenge to see how varied results from the focus group responses may contribute to a more complete and valid analysis.

To complement the end-of-module questionnaire and the focus group interviews, as a teacher-educator, a reflective journal was kept of tutor interpretations of how the module was progressing. Writing down thoughts about this module was a way of introducing the researcher to the discipline of critical reflective thinking. The journal was used to store personal accounts of tutor 'observations, feelings, reactions, interpretations, reflections and explanations' (Elliott, 1991) to help reconstruct the research position at any given time.

The selection, design and implementation of these research methods were based on practical need and situational responsiveness (Patton, 1987) rather than on the consonance of a set of methods with any particular philosophical paradigm. However, in interpretivist study, it is important to authenticate the interpretations as empirically based representations of program experiences and meanings, rather than as biased inquirer opinion. As the issue of validity of evidence can be difficult and complex (Macintyre, 2000), it was considered important to have a form of triangulation in place. Coupled with this was a belief that it was important to situate the researcher in relation to the participants in this study - to tell the story of the designer and tutor of this module and to ask questions which emanate from a desire to understand the participants' lived experiences.

Follow-up interviews with these participants will be an interesting aspect to a future study to investigate whether their perceptions of impact of the programme have been sustained.

B. Reliability, Validity, Verification.

Validity and reliability are critical issues in research studies (Creswell, 1998). These criteria were originally developed to measure the trustworthiness of methodological instruments, which have a deductive or positivistic view of science. The appropriateness in the evaluation of qualitative research has been questioned in the past and reported by both Punch (2000) and Morse and Field (1999); therefore it is proposed that the model for qualitative data analysis created by Lincoln and Guba (1985) will serve to achieve rigour in this study. According to this model there are four aspects related to validity and reliability. These are credibility, applicability, consistency and neutrality.

It is generally argued that validity is more likely if a variety of methods are used; in this study qualitative questionnaires, focus group interviews and reflective journal entries were employed. Hine (2000) suggests that such verification of qualitative studies usually depends on the breadth of observations that the research carries out. In this research, the teacher-educator has been a tutor on the module examined for eight years and has therefore managed to develop deep understandings of what goes on. Such sustained and involved presence in this program has allowed the verification of many observations and facilitated the drawing of authentic understandings and conclusions.

In considering the validity of this present study, a number of key areas were explored: how might the results and conclusions be incorrect? What are the plausible alternative interpretations and validity threats to these and how did we deal with these? How can the data collected support or challenge the researcher's ideas about what was going on? Why should the results be believed? This researcher concurs with Davies (1999) in his argument that a study has

produced valid knowledge when it has honestly examined and made visible the analysis and the basis of the researcher's knowledge claims are in reflexive experience.

In considering the reliability of this study, it is important to ask if the research findings are repeatable and how accessible are they to other researchers, in the sense of would another researcher of the perception of impact of teacher education programs, under the same circumstances, make the same observations leading to the same set of conclusions. It was important to be concerned about reliability within the confines of this study in the sense of continually cross-checking information obtained and interpretations developed. This was accomplished in this study by returning to the same topic and posing the same research objectives, under varying circumstances during the duration of the module, alongside checking verbal and written assertions with observations. Of course reliability within the context of this interpretative study should not be interpreted to mean absolute consistency. Even the most homogeneous group of academic staff/faculty will contain varying perspectives. Such variation, if it can be explained, may be as informative as great agreement on a particular interpretation. In fact, too much consistency in responses, as found by Kirk and Miller (1986) in their urban middle class Peruvian study, may indicate carefully rehearsed answers that are intended to conceal rather than clarify.

Given the fundamental importance of reflexivity in this participatory action research study, it is clear that in the strictest sense the criterion of reliability is not applicable, in that no study is formally or perfectly repeatable. Davies (1999, p.90) asserts that as with all knowledge, we must accept the incomplete and contingent character of qualitative research methods and believes this can be done without sinking into a relativistic hole in which no evaluation or improvement in knowledge is possible.

In qualitative research, rigour is judged according to trustworthiness, which is the degree to which a study's findings represent the experience of the participants. It is established through credibility, auditability, fittingness and confirmability. Credibility is established when the study participants recognise the research findings as an accurate representation of their experience; this is sometimes referred to as a member check or respondent validation. Auditability (or confirmability) is established when a knowledgeable reader or another researcher can follow thinking, decisions and methods of the researcher. Fittingness (or transferability) is established to the extent that other practitioners can use the study findings. Confirmability (or dependability) is established when it is obvious that the findings, conclusions and recommendations of the study follow logically from the data.

In this study, the subjective, partial and open-ended nature of the interpretation of the participants' responses and focus group interview discussions is acknowledged and it was the researcher, not the participants that interpreted the data of the discussions (even though they participated in participant verification sessions). The findings were interpreted in the light of the teacher education literature. It is also acknowledged that other interpretations of the data are possible. This study concurs with Morse *et al.* (2002) that as a qualitative researcher, it is important to reclaim responsibility for reliability and validity by implementing verification strategies integral and self-correcting during the conduct of inquiry itself. Cutcliffe and McKenna (1999) also put forth a compelling argument for this position and encourage researchers to return to the participants to attempt to gain verification. Any findings that were not recognised by the participants were identified and if disagreements existed, these were reported.

A two hour participant verification session was held with two of the three focus groups in this study on 5th and 8th February 2007 respectively; the majority of participants attended, and

both were audiotaped. The participant verification sessions were held to check, confirm and be certain about the findings from this study. Each session began with a clarification of the research objectives and participants were given an overview of the research design. The themes of the study were presented for discussion at the opening of the sessions (they had been previously emailed to all participants two weeks in advance of the sessions). The participants were asked to reflect individually on the themes for twenty minutes and asked to note down their thoughts. They were then asked from having been participants on the module and from having read the themes to comment on what had been written by the researcher. They were encouraged to make their general comments first and then to comment on each interpretive repertoire and this lasted 70 minutes.

Melia (1982) refers to a testing out/validation process that occurs in qualitative research where refining and checking the credibility of propositions, themes and categories that emerge in the data collection can be verified in subsequent interviews. As a consequence one of four responses can be obtained: firstly the participant agrees with the authenticity of the data and the representativeness of the interpretation and adds nothing new; at this stage the categories may have reached saturation; secondly the participant agrees with the authenticity of the data and the representativeness of the interpretation and adds further refinement and understanding to the category (this is a crucial component of category refinement); thirdly the participant disagrees with the authenticity of the data and the representativeness of the interpretation redirects the researcher's enquiry; fourthly the participant disagrees completely with the authenticity of the data and the representativeness of the interpretation and the researcher should completely rethink this line of enquiry.

The main way that standards were achieved in this study and to address the issue of small sample size was through the triangulation of data from different sources. Involving the participants themselves in articulating the emergent categories in subsequent verification sessions also strengthened internal validity, which LeCompte and Goetz (1982) have called the match between observations and developing theoretical ideas.

VII. Data Analysis and Findings.

The analytical approach used on all the data collected relied on categories developed through the literature and through my previous experience tutoring on this program. This analysis involved a process proposed by Miles and Huberman (1994): data reduction, data display and conclusion drawing and verification. As Cameron (2001) advised, thematic analysis involved finding patterns and proposing interpretations of the patterns together with accounts of the meanings and ideological significance of these patterns. Smith (1992) has described such thematic content analysis as a qualitative method of data analysis that is designed to extract consistent themes from a wide range of written or verbal communication. The use of direct quotes is used extensively in this section of the paper to provide evidence of both the shared enthusiasm for the Teacher Education program and also some real concerns voiced by the participants. Whenever possible by using the words of the participants themselves, key issues will be highlighted. For inclusion of all participant quotes, the following applies:

FG = Focus Group Interview (indicated by 1, 2 or 3 depending in which group the participant belonged)

Several interlocking major themes emerged from analysis of the 60 questionnaires and interviews of 18 participants: developing philosophy, self perceptions of program impact and a balance of experiences.

Developing a philosophy

Prior to starting this program, the participants had been asked whether they ever had the opportunity to explore their teaching philosophy:

My philosophy was entirely down to what I learned from the best lecturers I had in the past.

(Participant 3, FG1)

I can look back and see that I was applying a philosophy but it was being done unconsciously. I would have been expressing it in changes I was making to the course I was teaching and in conversations and discussions with my colleagues, particularly in reviews and the design of new courses and in course team meetings.

(Participant 5, FG2)

The main components of a teaching and curriculum philosophy identified by participants were: the aims of higher education, personal core values in relation to teaching and learning and putting this into practice, consideration of how students learn; reflection on past learning and identifying progression, consideration of a variety of teaching strategies and how and why to use them to improve the learning environment; the goals of teaching.

Developing a philosophical understanding for curriculum design happened in a number of stages: understanding what a philosophy is; reflection on current teaching practice; reflection on peer observation of teaching and critical appraisal of the observed teacher style. A number of interesting insights were offered by participants in relation to how they evolved their philosophies:

For me, the foremost thing to do was some soul searching.

(Participant 1, FG1)

I came up with a suitable metaphor to describe how I viewed the teaching and learning process; this took time but it helped to think about how I felt as a learner – in the past and on the course – and what I thought was important for being taught effectively. The reading that we were doing as part of our program and the peer discussions in class helped me enormously.

(Participant 20, Module Evaluation, 2005)

It took me a bit of time to get my head around this and I wasn't particularly comfortable with it. I was certainly conscious of the need to prepare the ground for students' workplace duties when they finish the course. I thought about what I wanted to try to get across to the students (I know this is very teacher centred) particularly about preparing them for workplace.

(Participant 32, Module Evaluation, 2005)

I wanted our group's curriculum project to be so innovative but we ended up with a more traditional one – would loved to be have been like the teacher in Dead Poets Society!

(Participant 5, FG1)

The core ideas in developing one's philosophy of teaching were identified by participants through designing curriculum based on a model of experiential and collaborative learning. These were equality, integrity, honesty and quality; and learning being an evolutionary process.

In our group we asked ourselves if the existence of a philosophy statement would affect one's teaching practice or if the journey to defining a statement was the real benefit.

(Participant 4, FG1)

The core ideas came from my understanding of how learning happens, and this was based on Kolb's Cycle; I then looked at my lesson plans and described how I incorporated each learning process (wanting to learn, learning by doing, learning by feedback and digesting what has been learned); I also discussed what I thought it was important that learners gained and that learners will encounter a period of disequilibrium before they understand something and making allowances for that.

(Participant 17, Module Evaluation, 2006)

Discourse with peers was a key feature of developing a philosophy to underpin teaching and the design of curricula:

I spoke a lot with my fellow program participants yes but not so much with colleagues in my department as I assumed they weren't on the same wavelength with regards to teaching and learning.

(Participant 1, FG3)

In talking to others I realized I had a philosophy deep down, I only needed to express it. One member of staff whilst reflecting on past experiences with me became upset at the realization of what went on in that department in the past and had put it from memory – or so they thought. Talking about it and reflecting back on it brought out all the emotions again.

(Participant 3, FG2)

There were 4 of us in the office preparing our teaching philosophies at the same time. We had open discussions about the topic but with some reserve. During the initial period I felt it was a very personal thing and was sensitive to criticism. The openness helped develop a deeper understanding of points of view and my own understanding of my philosophy.

(Participant 2, FG2)

It was great to get other ideas especially from the more experienced staff on the program who discussed teaching methods that have provided a better learner center environment.

(Participant 6, FG3)

Verbal interaction with others in the group to explore what I had written was an important component of this process.

(Participant 2, FG1)

Self perceptions of program impact

The central impact on curriculum design, teaching practice and student learning were identified as: constructive alignment of teaching and philosophy, increased confidence in teaching and the

curriculum design process, a renewed focus on student centred learning and an increased enthusiasm for teaching.

When designing new modules, I have to make sure that the teaching methods are consistent with my philosophy. I have something to measure my practice against.

(Participant 1, FG1)

I am now confident about my teaching because I have thought about it and know why I take the approach that I do. I am also equipped to reflect on changes and new situations and review my teaching philosophy in that context. In addition, I am confident about discussing my approach with colleagues and have found that such discussions are often very fruitful.

(Participant 6, FG3)

This has made me focus even more on the learner and from that point of view has been very rewarding. It brings me back to basic principles and to concentrate on the learners needs and not my own. It has also made me much more interested in my own job and has made it more of a vocation. The students also notice the difference in my style; if I were to do it again I would have involved my students directly in the process of writing my philosophy.

(Participant 45, Module Evaluation, 2005)

I now consider how students need to interact with the material in order to develop their own learning. Prior to this I was a traditionalist when it came to my teaching style.

(Participant 3, FG2)

I now approach it in a way that I believe that I would like to learn and how I should have been taught with more care and compassion for my learning needs - not just the didactic manner that we were taught which was assessed purely through examination and success was based purely on regurgitating what was taught and not learned.

(Participant 5, FG1)

I now know why I do this job. I have a better understanding of what I am about as a human being. It was always there but was undiscovered. I feel a lot more confident in my teaching and am more comfortable in the classroom. I always considered the students as individuals with their own perspective but now I understand why both student and lecturer think the way we do. We are influenced by the world around us. I now consider several teaching strategies for each class as the students require customized learning.

(Participant 2, FG3)

I believe it has helped to keep me focused on my role as a teacher. My philosophy is not at the front of my mind on a regular basis but is there in the background nonetheless. A colleague of mine recently applied for tenure and asked for my advice. I asked him what his philosophy of teaching was and did he ever write a philosophy. He seemed surprised at my comment and admitted he had never thought of his teaching philosophy. I wonder if he'll get the job?

(Participant 6, FG2)

I am reminded of my philosophy in indirect ways, by the reactions of students to my classes and comments they pass about other approaches, by thinking of 'why' some

lecturers present material in certain ways and so on. I think it is useful to take time out and review and re-understand your teaching philosophy. My approach to teaching and designing curricula is much more confident following writing my philosophy.

(Participant 53, Module Evaluation, 2005)

I have set goals for improvement, and approach the design of my classes in a more structured and thoughtful manner. Through reflection I am learning from my experiences. I use a greater range of teaching methods and constantly evaluate outcomes.

(Participant 17, Module Evaluation, 2005)

The nature of change from all respondents was cited as improvement/benefit in their teaching practice and/or the learning environment. Fullan (cited in Bennett *et al*, 1992, p.112) states that any change can be examined with regard to difficulty, skill required, and extent of alterations in beliefs, teaching strategies, and use of materials. The innovations cited by the respondents were largely curriculum or classroom focused changes. The characteristics of the changes can be looked at in terms of their size, complexity, prescriptiveness and practicality for the teachers involved. Simple changes may be easier to carry out, but they may not make much of a difference. Practical changes are those that address salient needs, that fit well with the teachers' situation, that are focused and that include concrete how-to-do-it possibilities. Successful organisations are those that encourage cultural change and improve organisational effectiveness through the development of a shared vision which is seen to emerge from the personal visions held by individuals within the organization (Broadbent, 1998).

The individual teacher's characteristics can play a role in determining implementation of change. Some teachers, depending on their personality, and influenced by their experiences on this course, are more self-actualised and have a greater sense of efficacy, which leads them to take action and persist in the effort required to bring about successful implementation of change. In the final analysis, according to Fullan (cited in Bennett *et al*, 1992, p.117), it is the actions of the individual that count. All participants on the course were aware that change involved learning to do something new. This, alongside having a work environment that could stimulate continuous improvements was an important factor emerging from this research.

Balance of experiences

Not all experiences of the program were perceived as positive. Within this, there is also attentiveness to the idea that almost every important learning experience we have ever had has been stressful. This means that the capacity to suspend belief, take risks and experience the unknown are essential to learning. Under conditions of uncertainty, learning, anxiety, difficulties and fear of the unknown are intrinsic to all change processes, especially at the early stages (Fullan, 1993, p.25). As indicated by some of the respondents, some form of conflict is essential to any successful change effort; change itself is learning.

It was a very painful process for me; I examined my mind like never before. My beliefs were not all misguided. My equality paper was good therapy. My recording of new teaching practice was enlightening and I also received valuable feedback from peers and tutors to guide me along the way.

(Participant 2, FG2)

The year presented laborious challenge after challenge for me but there is no doubt now that the 'light bulb' has been lit! Hopefully more illumination is around the corner.

(Participant 5, FG3)

Developing a personal philosophy of teaching, which is informed by and contributes to the organizational, community, societal and global contexts of education is an important facet of the work of the Postgraduate Certificate in Third Level Learning and Teaching. When these teachers work on personal vision-building and see how their commitment to making a difference in the classroom is connected to the wider purpose of education, it gives practical and moral meaning to their profession. The program uses the Teaching Portfolio as a vehicle to get them started on this, by enabling them to pursue learning through constant inquiry; thereby they are practicing what they preach, benefiting themselves and their students by always learning.

When one teacher collaborates with another, or many teachers work in a new alliance with each other and external partners, they are enlarging their horizons as they lengthen and strengthen the levers of improvement. When many educators act this way, systems start to change, and according to Fullan (1993, p.145) become the environments that prod and support further growth and development.

However, with all the emphasis we place on collegiality and collaboration, the capacity to think and work independently is also essential to educational reform. Meaningful reform can escape the typical teacher in favour of superficial, episodic reform (Fullan, 2001, p.36). It is important for these teachers to be aware of false clarity whereby they think their practice has changed, but it has only occurred in a superficial way. This point can be made to future course participants now as a result of this study.

C. Consideration of study limitations.

Whilst studies of this kind are useful in helping practitioners vicariously gain insights into their own practice, the findings of this study should be taken as tentative. Knowledge about the ways in which lecturers learn on professional development programs should help us in our practice as teacher educators and stimulate both discussion and debate about the purpose of asking participants to engage in this form of learning.

Three challenges were encountered during the study. First, the impact of the researcher's subjectivities both on the participants' behaviour and on interpretation of the data need to be acknowledged. Many participant statements fitted into several themes, which meant accepting the ambiguity and inextricable complexity of experience. Taking this into consideration, themes identified emerged from the analysis and were refined through subsequent conversations with the participants in a verification session in February 2007.

Second, the study was small scale; focusing on the self perceptions of 60 participants enabled the performance of an in-depth analysis of the data, yet the small number of participants limits applicability of the findings.

A final challenge concerned the notion of addressivity of 'compliant talk' by the participants in the study. Due to the dual role in the relationship between the researcher as tutor and the lecturers who were learners on the program and participants in the study, it is acknowledged that the possibility that the participants may have said what they thought you wanted to them to could be considered a limitation. However by building triangulation into the research process this possibility was lessened.

IX. Implications for Pedagogy and Practice in Teacher Education.

Uncertainty is characteristic of the future context of higher education. It can, however, be expected that the context of practice will not become less complex or less demanding of the professional. This teacher education program recognizes a number of traits that participants bring to academic practice: as professionals, they succeed in constantly coping with the changes and challenges the future context of practice present; they succeed in developing into an expert that can competently fulfill all their responsibilities; they never stop learning; and they succeed in maintaining their professional competence.

Similarly to Quinn and Vorster (2004), this program encourages reflective practice rather than solely developing generic skills and techniques in the professional development of lecturers. Exploring personal knowledge systems and practices accumulated through experience can lead to more significant changes in professional practice. Reflection does take place in an informal, individualised manner with most participants, but an intentional professional development activity in reflective practice may make it more systematic and deliberate. Reflection should, however, be supported by theory and collegial interaction in order to challenge or confirm the validity of their experiences and practices. It is contended that the program under study facilitates the professional development of lecturers in terms of curriculum design, reflection, developing knowledge within the field of higher education and providing professional accreditation.

However, it is accepted that attaining a qualification does not guarantee the maintenance of competence or expertise. Satisfaction and participation are not sufficient indicators of effective teacher education. Research should not only focus on formal programs, as a major part of continuing learning takes place through informal and self-directed means. Evaluation research such as this study, will further lead to the identification of practice problems and issues, which will support the identification of new educational services that are needed. Proper evaluation will form the cornerstone for the improvement of professional practice and it is also essential in terms of accreditation (McDonald, 2001; Calman, 2000; Daley and Mott, 2000).

This final section of the paper considers the consequences of the findings of this study for transfer to other programs in multiple disciplines. The findings emerge under two areas: pedagogy and practice. Pedagogically, design issues centred on whether the real life group project would make the participants' learning more accessible and whether it would promote improved learning. It was vital to promote best practice in the integration and use of curriculum design to the program, so that the participants in turn could apply what they had learned to their own teaching situation for their own students.

Times have changed and students now need to be able to think flexibly and creatively, solve problems and make decisions within complex multidisciplinary environments. The participants were made aware of this through the program and the need for integrating different instructional methods, techniques and strategies. They in turn, discussed the areas of student responsibility and initiative, generative learning activities, authentic learning contexts and teaching strategies, and co-operative support from peers. Interaction is a critical component of the learning environments because learning on the program occurs in a social context through collaboration, negotiation, debate, and peer review.

The program aimed to make the participants aware that introducing new forms of curriculum design can be exciting and rewarding, but it also can be complex and time consuming. Not only does it involve them acquiring new knowledge and developing a range of

new skills, it also requires that they become “expert” in a new way of teaching and their students become proficient in and enthusiastic about a new way of learning. At the same time, from a practical perspective, they may have to enthuse their colleagues in their departments about the benefits of adopting a particular approach.

In terms of student learning, it is suggested that such collaborative curriculum project work allows teachers to explore and discover a variety of perspectives, learn about teaching in different ways, engage in complexity and ambiguity, recognise the gaps in their understanding, learn by teaching, develop listening, explaining and questioning skills, develop a sense of group identity, increase their emotional connection with a topic, exercise leadership and other roles and form independent judgements.

An enquiry based collaborative group project can change the classroom dynamic and replace the competition between individuals for knowledge with a pedagogy that places emphasis on knowing and learning as communal acts requiring many experiences and observations. As well as benefits in terms of knowledge and understanding, learners have identified participation, a sense of belonging and a deeper learning experience as important dimensions of the collaborative group learning experience.

The combined experiential, philosophical and collaborative learning cycle will continue to be the model under which the program is implemented as the capacity of this method to encourage learning is evident from our experiences as tutors. The participants appreciate the active, theoretical, experiential and collaborative nature of this work and the safe and conducive environment in which it takes place.

When individuals enter a learning environment and begin the process of listening, thinking and reflecting, they become engaged in a constant attempt to capture the meaning of what is being said and done. This is an ongoing process in which the learners try to link in any new information or behaviour with the things they ‘know’ or understand to be the case already (Spinks and Clements, 1993, p.178).

The program will continue using opportunities to enable the participants to move from examining their concrete experience of learning and teaching, supported by a range of learning experiences, through the steps of abstraction, reflection and active experimentation. This will be achieved through the participants developing their lifelong learning skills and strategies, such as setting learning objectives, action planning, learning-strategy selection and assessment, information handling skills, developing understanding, linking theory to practice, practising discussion, argument, and articulation of ideas, practising teamwork, resource selection and evaluation, time management and reflective learning. Indeed, Crossley and Watson (2003) make the case for improved dialogue and a strengthening of the relationship between theory and practice as the way forward in improving educational policy and practice. This program is an important step toward these goals.

The academic staff/faculty participants on this teacher education program care about teaching and learning as serious intellectual work. The goal of the program is to continue to foster inquiry and disseminate findings about what improves and articulates higher education learning and teaching. It is hoped that this study will promote cross-disciplinary conversation to create synergy and prompt new lines of inquiry into the future.

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Factors influencing academic performance of students enrolled in a lower division Cell Biology core course

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Abstract: Students' performance in two semesters of our Cell Biology course was examined for this study. Teaching strategies, behaviors, and pre-course variables were analyzed with respect to students' performance. Pre-semester and post-semester surveys were administered to ascertain students' perceptions about class difficulty, amount of study and effort put into the course, and professional goals. Chi-square (χ^2) tests of independence showed that completion of chemistry requirements, passing the laboratory component of Cell Biology, homework, and attendance were related to passing our course. Logistic regression showed that perfect attendance followed by GPA, were the most important factors associated with passing the course.

Keywords: undergraduate, GPA, attendance, lower division cell biology, pre-requisites, assessment

I. Introduction.

As educators, one of the most important goals of our teaching is to help students understand the course material. Equally important for science students, is the goal of obtaining a grade that will facilitate academic and professional advancement.

Numerous science education studies have focused on the question of which teaching strategies are best for improving students' learning and overall course performance. Some of these have emphasized the development of scientific inquiry as a way of increasing students' understanding of the content being taught in the course (Ebert-May et al., 1997; DebBurman, 2002; Wright and Boggs, 2002; Knight and Wood, 2005; Smith et al., 2005). For the most part, teaching strategies studies deal with what we can do to improve our students' content understanding. But very few of these studies provide insights about the type of experiences or factors the students must have before they enroll in our courses in order to succeed.

Several studies have ascertained if demographic factors, previous experiences, or background are associated with students' course performance. Some of these have examined the importance of previous GPA (Graunke and Woosley, 2005; Tai et al., 2005; Salaiman and Mohezar, 2006; Freeman et al., 2007; Klomegah, 2007), academic background and course pre-requisites (House, 1994; House, 2000; Tai et al., 2005), demographic characteristics such as gender (Graunke and Woosley, 2005; Salaiman and Mohezar, 2006), and students' own perception of their abilities (House, 2000; Klomegah, 2007).

Our study aimed to identify factors associated with students' success in a large, lecture and laboratory, lower division, undergraduate Cell Biology course. The following research questions guided our investigation:

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- (1) Which pre-course variables (such as GPA and completion of course pre-requisites) are associated with student performance in our lower division cell biology course?
- (2) Which in-class behaviors (such as attendance and completion of homework) are associated with student performance?

II. Methods.

A. Lower Division Cell Biology Course at San José State University.

Our biology majors enroll in a three-semester core biology sequence (Biology 1, Biology 2, and Biology 3). Each course has a lecture and a laboratory component. All core courses are taught every semester, with an average of 100 students enrolled in each course. The pre-requisites for the Cell Biology course (Biology 3) are completion of Biology 1 course and the first semester of the freshman chemistry sequence (Chemistry 1A at SJSU), both with a C or better. Co-requisites include Biology 2 and Chemistry 1B. A passing grade in the Cell Biology course is a C or better.

B. Course Design.

Two spring semesters (2004 and 2005) were examined for this study. The same instructor, author J.S., taught both semesters using the following learning cycle in each lecture:

Students read material before coming to class (*as presented* by Kitchen et al., 2003)→then students were posed with an engaging question at the start of the lecture (research-based, sometimes discrepant, 1 min)→small group (2-3 students) discussion followed (5 min, *modified from* Ebert-May et al., 1997)→Socratic approach lecture (25 min)→Another research question was posed (expanding on the first one, providing more evidence)→small group discussion (5 min) followed→the research question was answered by student groups or by the instructor (5 min) → quizzes (2 min), or exit tickets were completed at the end of lecture. The exit ticket contained the student's name, a concept they understood and a concept they had difficulty understanding from the material that was covered in lecture.

The final course grade for each student was calculated as follows: 4% for participation (daily quizzes in 2004, and exit tickets in 2005), 4% for a book report, 42% for three exams during the semester, 25% for a final, and 25% for lab performance (quizzes, homework, and two exams with a practicum component). Lecture exams contained questions involving the analysis of research data and problem solving. Students were requested to pick up their graded exams during office hours, or by appointment.

Although the class content, overall delivery, and assessment were the same in both semesters analyzed, several instructional strategies differed. In 2004 only, students were required to turn in answers to homework problems, had daily quizzes, and had access to digitally videotaped lectures on CD-ROM. In 2005 only, students were required to sign and adhere to a social/syllabus contract, homework problems were optional, videotaped lectures were not available, and exit tickets were collected. The social/syllabus contract was derived from the course syllabus and emphasized students' responsibilities in the class and for their learning.

C. Participants.

One hundred and eighty-four students from the 2004 and 2005 Cell Biology class participated in this study. Twenty students (eight from 2004 and 12 from 2005) did not participate. Participation in this study was not required for course credit. Twenty-three percent and seventeen percent of the 2004 and 2005 participants, respectively, were graduate or post-baccalaureate students, the rest were undergraduates.

D. Data Collected.

University transcripts were collected during the first week of the semester. The transcripts were used to gather information regarding prior GPA, completion of pre-requisites and co-requisites, and grades obtained in the pre- and co-requisite courses. The instructor kept a record of students who had turned in homework assignments, taken quizzes, and used videotaped lectures for the 2004 class. Attendance for 2004 was determined by the collection of daily quizzes. In 2005, students were required to sign a social/syllabus contract and the contract was collected during the first week of the semester. Attendance for 2005 was determined by the collection of daily exit tickets. For both 2004 and 2005, students' grades for each exam, the laboratory component, and the overall score were recorded. Pre and post surveys were administered to ascertain students' perceptions about the class difficulty, and amount of study put into the course (Appendix 1).

III. Results.

Data were taken from class records kept by the instructor or from the pre-instruction and post-instruction surveys completed by the students. We used chi-square test of independence for results reported here, unless otherwise noted. Passing/not passing was used as a measure of success in order to simplify the analyses. Passing was defined as earning a C or better. Chi-square examined whether two categorical variables, such as Passing/Not Passing Cell Biology and completion of prerequisites, were related. In addition, direct logistic regression was used to analyze the association between three variables (completion of Biology and Chemistry course pre-requisites, attendance, and GPA) and passing our Cell Biology course.

A. 2004 and 2005 classes had similar passing rates.

Table 1 shows demographic characteristics of the participating students from the 2004 and 2005 classes we used in this study. The participation rate for the 2004 class was 93%, and 78% for the 2005 class. The dropout rate was 7% and 3% for the 2004 and 2005 classes, respectively. This rate did not differ between 2004 and 2005, $\chi^2(1) = 2.387$, $p > 0.05$.

Table 1. Demographic Characteristics of the classes we examined in this study*.

Demographic Characteristics	2004 Class	2005 Class
Non-participating students	8	12
Participating students	107	77
Female	46	52
Male	61	25
Undergraduate	82	64
Sophomore	26	14
Junior	34	31
Senior	22	19
Post-baccalaureate	25	11
Graduate (M.A. or M.S.)	0	2
Students who dropped the course	8	2
Students who obtained an A+ to A-	19	20
Students who obtained a B+ to a B-	30	15
Students who obtained a C+ to C	20	17
Students who failed the Course**	30	23
Mean Course GPA (Std. Dev.)	2.97 (0.546)	2.99 (0.498)

*Data presented in this table include demographic information from participating students only. ** C- or below

There was a significantly higher proportion of males in 2004 compared to 2005, $\chi^2(1) = 10.834$, $p \leq 0.05$. The proportions of sophomores, juniors, seniors, post-baccalaureate, and graduate students did not differ between 2004 and 2005 $\chi^2(4) = 6.689$, $p > 0.05$. The proportions of students earning As, Bs, Cs, or below C did not differ between 2004 and 2005, $\chi^2(3) = 2.939$, $p > 0.05$. Unpaired t-test showed that the overall percentage of points earned was similar between the 2004 (79%) and 2005 classes (76%), $t(162) = 1.349$, $p > 0.05$. Moreover, the percentage of students who passed each class, approximately 70%, did not significantly differ between 2004 and 2005, $\chi^2(1) = 0.446$, $p > 0.05$. Because the statistical results for 2004 and 2005 classes did not qualitatively differ when analyzed separately, the data for the two classes were combined, unless otherwise noted.

B. Post-baccalaureates vs. undergraduates.

We compared passing rates in Cell Biology for undergraduates, graduate, and post-baccalaureate students. Post-baccalaureate students were more likely to pass Cell Biology than undergraduates, $\chi^2(2) = 7.026$, $p \leq 0.05$. Ninety-three percent of post-baccalaureate students and 69% of undergraduates passed the course. Two graduate students enrolled in the 2005 course, one passed (Table 1).

C. Are specific chemistry courses related to passing Cell Biology?

Students who took both Chemistry 1A and 1B, were more likely to pass Cell Biology than those who only took Chemistry 1A, $\chi^2(1) = 10.893$, $p \leq 0.05$. Fifty-two percent of those who only took Chemistry 1A passed while 80% of those who took both chemistry courses passed. Students who took Organic Chemistry courses were no more likely to pass the Cell Biology course ($p > 0.05$ for both analyses). The likelihood of passing Cell Biology, was not

increased by taking chemistry courses at SJSU, rather than at another institution ($p > 0.05$ for all analyses).

D. Are introductory biology courses related to passing Cell Biology?

Passing Cell Biology did not depend on whether students took both Biology 1 and 2 courses or only one of them, $\chi^2(2) = 0.750$, $p > 0.05$. The likelihood of passing Cell Biology also did not depend on whether students took Biology 1 and 2 at SJSU rather than elsewhere ($p > 0.05$ for both analyses). According to the post-survey, most students did not feel that the Biology 1 and 2 courses prepared them for the Cell Biology course, regardless of whether the students passed or failed Cell Biology, $\chi^2(1) = 0.978$, $p > 0.05$.

E. Attendance, Quiz Scores, Homework, and Effort.

Students who passed Cell Biology had better attendance records than those who did not pass, $\chi^2(4) = 32.821$, $p \leq 0.05$ (Fig. 1). Attendance was classified as either perfect, very good (99-90% of lectures attended), good (89-80%), fair (79-70%), or poor (69% or less).

Forty-four percent of students who passed had perfect attendance and 27% had very good attendance. Only 7% of those who passed had poor attendance.

Quizzes were given in the 2004 class only, and scores on the quizzes were categorized as perfect, very good (99-90% correct answers), good (89-89% correct answers), fair (79-70% correct answers), or poor (69% or less). Passing the class did not depend on which quiz score category the student was in, $\chi^2(4) = 1.120$, $p > 0.05$.

Homework was assigned in the 2004 class only, in which the amount of homework completed was significantly related to passing Cell Biology, $\chi^2(4) = 38.885$, $p \leq 0.05$ (Fig. 2). All students who did not complete any homework failed the course. Ninety-seven percent of the students who completed 100% of the homework passed the course. Forty-two percent of the students who completed 50% of the homework passed the course. All students who completed 25% of the homework passed the course, although most in this group earned a C.

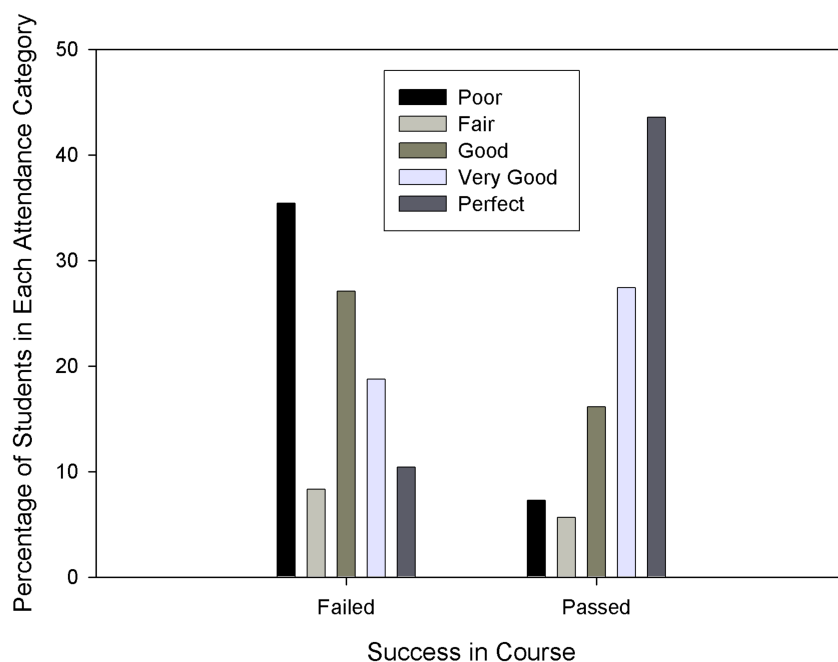


Figure 1. Students’ attendance records were compared to examine if they were related to students’ ability to pass the course. This graph depicts combined data for 2004 (n =107) and 2005 (n = 77). In 2004, attendance was kept by the collection of daily quizzes. In 2005, it was kept by the collection of “exit tickets”.

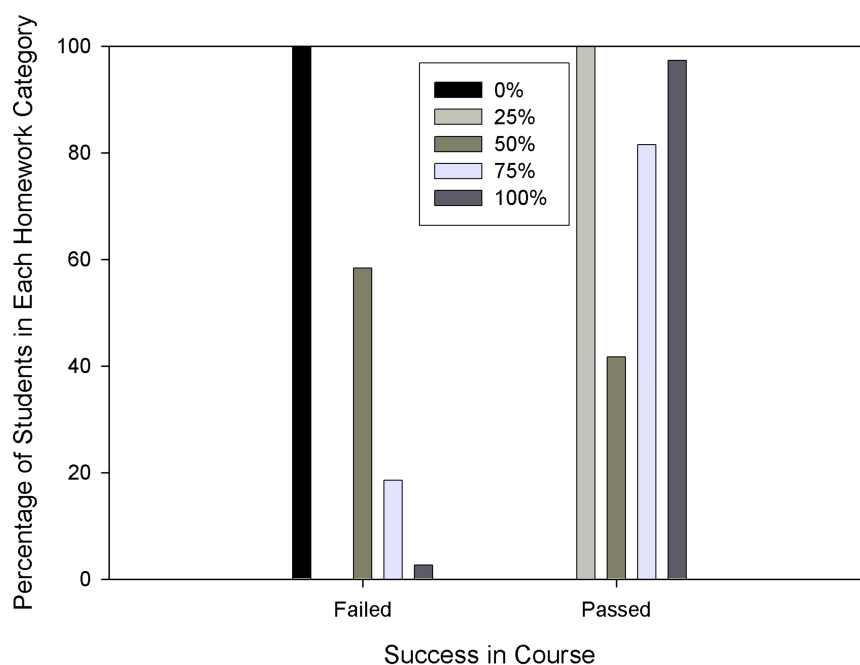


Figure 2. In 2004 only, students were required to turn in solutions to homework problems. Completion of homework was related to passing the course, $\chi^2(4) = 38.885$, $p \leq 0.05$. Bars depict the percentage of homework completed.

F. Association between the laboratory grade and passing Cell Biology.

Students who passed Cell Biology were more likely to have earned a passing grade in the laboratory as well, $\chi^2(1) = 55.670$, $p \leq 0.05$. Of those who failed the laboratory, 79% failed the class. Of those who passed the laboratory, only 14% failed the class.

G. Association between GPA and passing Cell Biology.

Unpaired t-test showed that students who failed Cell Biology entered the course with a significantly lower GPA (mean = 2.71, standard deviation = 0.440) than those who passed Cell Biology (mean = 3.09, standard deviation = 0.519), $t(155) = -4.252$, $p \leq 0.05$. Moreover, a higher GPA was significantly correlated with a higher percentage of points earned in the course, $r(150) = 0.460$; $p \leq 0.05$.

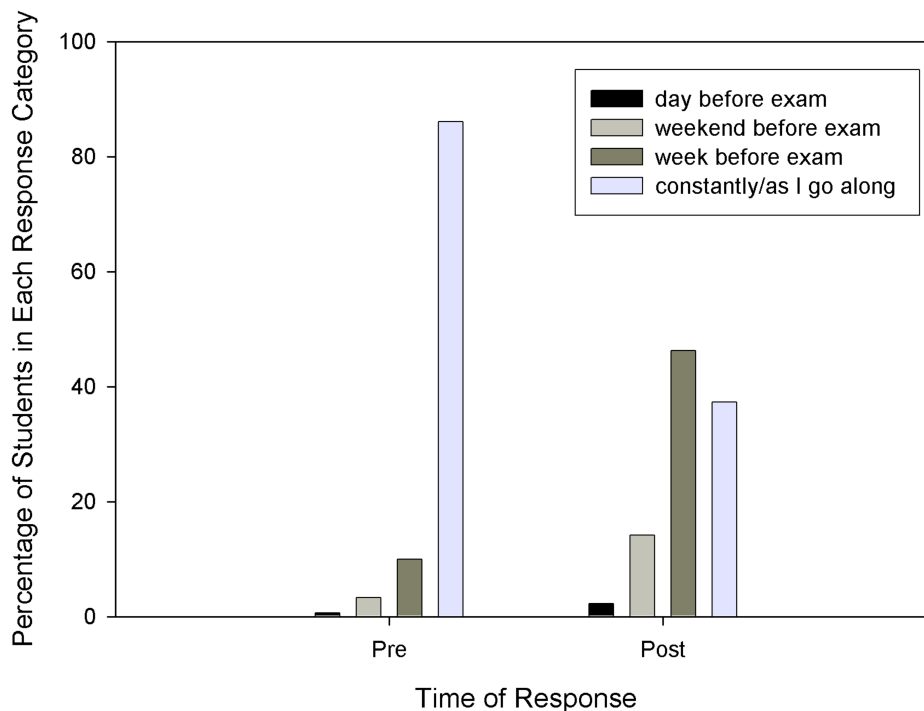


Figure 3. Students self-reported study habits. Students' responses to pre/post survey questions regarding when they expected to study (pre-survey) or actually studied (post-survey) for exams were compared to whether they passed or failed the course. Data for the 2004 and 2005 classes were combined for this analysis.

H. Relative importance of prerequisites, attendance, and GPA.

Direct logistic regression was used to compare completion of course pre-requisites, attendance, and GPA as correlating factors of passing the Cell Biology course. All were coded as dummy variables except for the continuous variable GPA. GPA ($p = 0.046$), perfect attendance

($p \leq 0.001$), and very good attendance ($p = 0.011$) associated significantly with passing the class. The odds ratio for GPA was 2.509, for perfect attendance was 32.530, and for very good attendance was 5.394. In other words, the odds of passing the class were increased by 2.509 for having a high GPA, were increased by 32.530 for having perfect attendance, and were increased by 5.394 for having very good attendance. The prediction success rate for this model was 70% correct.

I. Videotaped lectures on CD-ROM.

CD-ROMs containing digitally recorded lectures were offered to students in the 2004 class only. Passing the class was not related to using the CDs, how often they were used, or when they were used ($p > 0.05$ for all analyses).

J. Study habits.

Expected and actual study habits differed, $\chi^2(3) = 72.655$, $p \leq 0.05$ (Fig.3). The amount of study anticipated by students during the pre-survey was not related to passing the class; the same was true of the amount of study reported in the post-survey ($p > 0.05$ for both analyses).

The types of strategies that students anticipated would help them pass the course differed from what they reported helped them in the post-survey, $\chi^2(4) = 21.317$, $p \leq 0.05$. Fifty-three percent of students reported “attending lecture” and 36% reported “gaining a conceptual understanding of the material” in the pre-survey whereas in the post-survey, 50% reported “attending lecture”, 26% reported “reading the required material” (up from 8% in the pre-survey), and 20% reported “gaining a conceptual understanding of the material.” Passing the class was not related to how students ranked their study strategies in the post-survey, $\chi^2(3) = 3.723$, $p > 0.05$.

IV. Discussion.

In this study, we examined associations between several variables and passing a lower division cell biology course.

A. Passing our course as a measure of success.

We used passing the course as a measure of students’ success since we did not have a significant sub-sample size for each grade group. Passing the course indicates a level of success as it implies a degree of content understanding as well as a grade that allows students to remain in the major. At SJSU, students must earn a grade of C or better in Cell Biology in order to be allowed to enroll in upper division Biology courses. In addition students can only repeat this course once, if they obtained a non-passing grade. For some students, a C in this course is a realistic measure of success. For others interested in pursuing an advanced graduate or professional degree, a grade lower than A may represent failure.

B. Attendance associated with passing our course.

Our direct logistic regression showed that the most significant association for passing our Cell Biology course was perfect attendance. Our data showed that attendance was critical even when students had access to videotaped lectures. That is, watching the lecture passively at a later time did not supplant being in the classroom and participating in lecture discussions. Sixty-three percent of the students who used the videotaped lectures had poor attendance. These students missed the two group discussions that occurred during lecture, since the videotapes did not capture the discussions and strategies the students used to answer the questions. Some of the students who came regularly to lectures used the videotapes to reinforce the material, and to fill in gaps of their lecture notes. Attendance may have been important since modeling of research problem solving occurred during lectures. Similarly, Freeman et al. (2007) showed a positive relationship between attendance and classroom performance. Devadoss and Foltz (1996) found a strong positive relationship between prior GPA, attendance, and overall grade obtained in class. Furthermore, Durdeen and Ellis (1995) found that lack of attendance had a negative effect on performance only after missing four classes or more. Others have shown that attendance affects GPA of elementary school (Heberling and Shaffer, 1995) and high school (Brodbelt, 1985) students.

C. Previous GPA associated with passing our course.

A higher GPA prior to enrolling in our course was also associated with passing the course in our study. Perhaps students with higher GPAs had previously developed study skills and habits that prepared them for conceptual learning, data analyses, and research-based problem solving, and as a consequence were able to depend less on teacher-driven instruction.

Although previous GPA is the result of many different variables, researchers have used it in studies where associations or predictors of academic performance or success were determined (Bean and Bradley, 1986; Graunke and Woosley, 2005; Salaiman and Mohezar, 2006). For instance using a linear regression model, Freeman et al. (2007) showed that previous GPA could be used as a predictor of students' grades in an introductory biology course sequence. Tai et al. (2005) argued that grades are a valid measure of success, since they can be viewed as a summative assessment of students' performance in a course. Tai et al. (2005) examined course pre-requisites, past grades, and answers to survey questions to examine factors that influence success in college chemistry. They found that high school background, grades, and pedagogy had the greatest effect on helping students perform well in college chemistry.

D. The laboratory component.

Laboratory exercises are one of the few places in college science courses where students can use hands-on experiences to learn concepts (Tanner and Allen, 2004). These activities may be important for students that depend on kinesthetic means for learning the material. Our laboratory exercises allow students to manipulate materials to develop understanding of key concepts as they are introduced to the same topics in lecture. In addition, our laboratory exercises followed closely the content covered in lecture. For instance, a bacterial lipid TLC laboratory activity was done during the week when the cell membrane composition was covered in lecture.

The laboratory component might have been an important instructional tool, as most students who performed well in this component passed the course. However, we can not exclude the possibility that the association we found between passing the laboratory and the course is not directly related to the lab activities per se, but to the characteristics of the students themselves, as the total number of points earned in the class was correlated with the total number of points earned in the laboratory ($r(162) = 0.839$, $p \leq 0.05$). That is, students who performed well in the lecture also performed well in the lab.

E. Study habits.

Our students showed changes in attitude regarding expected and performed study habits. Most of the students (86%) reported the expectation of studying constantly (as “*I go along*” in the pre-survey) before the course began. At the end of the course (post-survey), that percentage dropped to 37%. It is possible that although most students expected to spend a large amount of time studying, their commitments to other courses or outside work prevented them from doing so. This is a reasonable explanation since most of our students must work outside of the university to support their education.

Students’ perception of what study habits are needed to perform well in a class depends on the strategies used in previous courses and on the experiences provided by the current class (Bartling, 1988). Post-baccalaureate students came to class with well-developed study strategies. Traditional undergraduates taking our class have only experienced one or two college biology courses before they enroll in Cell Biology. In our course, undergraduates were exposed to modified lectures and an emphasis on conceptual understanding over memorization of definitions and facts. Thus, most of these students needed to adjust to a different way of learning the material. One of the biggest obstacles for the students who struggled and failed the course was their inability to adjust to a different teaching and examination style. An example of an exam question is included as Appendix 2.

F. Lessons learned.

More than 75% of the students surveyed thought that effort should be counted as part of their overall grade. However, the majority of students could not suggest how the instructor should assign points for students’ effort. We think that their notion that instructors could assess effort, weigh it fairly, and accordingly, add points to their overall grade is derived from their earlier academic experience in elementary, middle, or high school.

Most of the students complained about the high expectations and the difficulty of exam questions when they were taking the course. Before the 2005 class, students thought that the course expectations and the exam questions were unfair. Bean and Bradley (1986) suggested that college students equate course material difficulty with being unpleasant, and not necessarily with being challenging. The unfairness perception as it relates to course difficulty changed after we implemented the social/syllabus contract. Several of the students enrolled in the 2005 class came to the instructor’s office, a semester or a year later, to thank him for preparing them for more challenging courses. They told him that one of the most important lessons they learned in the course is to accept and deal with a challenge, and not think that course difficulty is unfair.

It became clear that students defined studying “*constantly*” as spending two-to-three hours, three-to-four times a week on course material. The strategies used by some of the students

during the studying times included reading the book, typing their lecture notes, group discussion after class, and solving homework problems. We learned that once students were comfortable with the teaching strategy and the type of exam questions, their study habits changed.

Our biology freshman core is currently being restructured at SJSU. One of the authors of this article (J.G. Soto) is involved in the development and implementation of the new course sequence. Some of the strategies that will be implemented include the use of a social contract, the completion of two semesters of Chemistry freshman sequence, and the incorporation of problems in a workshop/discussion section.

G. Taking responsibility for their own learning.

We observed a shift in students' perceptions about their own learning responsibility as we read their comments to the exit tickets. As the 2005 semester progressed, in about 70% of the exit tickets collected for the concept they had difficulty understanding, students wrote comments like *"I need to go over the material on my own,"* or *"I need to re-read the assigned material before I can formulate good questions"* (paraphrased by the authors). As science educators, we feel that allowing students the opportunity to feel that they are responsible for learning and doing well is the best possible outcome of the teaching strategies we used in our course.

Appendices

Appendix 1. Bio 3 Pre- and Post-Survey

Two last letters of last name _____ Student ID Number: _____

Major: _____

Your participation on this survey will not affect your final grade in this class. This survey is designed to help us understand how we can help you do better in Bio 3.

Circle the appropriate answer.

1. Are you a:

- a) Sophomore
- b) Junior
- c) Senior
- d) Undeclared
- e) Post-baccalaureate
- f) Graduate Student

2. Are/were you a transfer student?

- a) Yes
 - b) No
3. Are you currently enrolled in a chemistry course?
- a) Yes
 - b) No

4. If the answer to question #3 is yes, then you are currently enrolled in:

- a) Chem 1B 32
- b) Organic Chemistry I
- c) Organic Chemistry II
- d) Biochemistry 1
- e) Other _____

5. What is the last chemistry university course you took?
 - a) Chem 1A
 - b) Chem 1B
 - c) Organic Chemistry I
 - d) Organic Chemistry II
 - e) Biochemistry
 - f) Other _____
6. Did you take Chem 1A at:
 - a) a Community College
 - b) SJSU
 - c) Other _____
7. If you took Chem 1B prior to enrolling in this class, did you take the course at?
 - a) a Community College
 - b) SJSU
 - c) Other _____
8. After taking Bio 3, you expect to gain
 - a) A superficial understanding of cell biology concepts
 - a) A good understanding of cell biology concepts
 - b) An in-depth conceptual understanding of cell biology concepts
 - c) Other _____
9. Do you expect Bio 3 to be at the same level of academic rigor (*difficulty*) as Bio 1 and Bio 2?
 - a) Yes
 - b) No
10. I expect Bio 3 exams to gauge:
 - a) A superficial understanding of cell biology concepts
 - b) A good understanding of cell biology concepts
 - c) An in-depth conceptual understanding of cell biology concepts
11. Based on your previous experience in Bio 1 and 2, I anticipate studying for Bio 3:
 - a) the day before the exam
 - b) the weekend before the exam
 - c) a week before the exam
 - d) as I go along
12. Based on your previous experience in Bio 1 and 2, predict and rank the following strategies (in order of importance, 1 been the most important) as being more effective in obtaining a passing grade in Bio 3:
 - _____ attending lecture
 - _____ reading the required reading
 - _____ attending office hours
 - _____ completing the homework
 - _____ memorizing facts
 - _____ gaining a conceptual understanding of the material

13. Based on your previous experience in Bio 1 and 2, predict and rank the following strategies (in order of importance, 1 been the most important) as being more effective in obtaining an "A-A+" grade in Bio 3:

- _____ attending lecture
- _____ reading the required reading
- _____ attending office hours
- _____ completing the homework
- _____ memorizing facts
- _____ gaining a conceptual understanding of the material

14. Should effort be counted as part of your class grade?

- a) Yes
- b) No

15. What is your professional goal after you finish your degree/program at SJSU?

- a) Attending graduate (Ph.D) school
- b) Attending medical school
- c) Obtaining a degree in other health related professions (dentistry, pharmacy, etc)
- d) Obtaining employment in my area of expertise
- e) Undecided

Bio 3 Post Survey

Two last letters of last name _____

Student ID Number: _____

Major: _____

Your participation on this survey will not affect your final grade in this class. This survey is designed to help us understand how we can students do better in Bio 3.

Circle the appropriate answer.

1. After taking Bio 3, you have gained

- a) A superficial understanding of cell biology concepts
- d) A good understanding of cell biology concepts
- e) An in-depth conceptual understanding of cell biology concepts
- f) Other _____

2. Was Bio 3 at the same level of academic rigor (*difficulty*) as Bio 1 and Bio 2?

- a) Yes
- b) No

1) Rank in order of interest the topics you found more interesting in cell biology:

- _____ Gene Regulation
- _____ Cancer
- _____ Cell structure
- _____ Cellular energetics
- _____ DNA replication
- _____ Cell-cell interactions

2) What chemistry course do you think would have prepared you better for Bio 3?

- A) Chem 1B
- B) Chem 112A (Organic Chemistry I)
- C) Chem 112B (Organic Chemistry II)
- D) Other _____

- 3) In your opinion, did Bio 1 and 2 prepare you for Bio 3?
- Yes
 - No
6. In my opinion, Bio 3 exams assessed:
- A superficial understanding of cell biology concepts
 - A good understanding of cell biology concepts
 - An in-depth conceptual understanding of cell biology concepts
7. How much did you study for Bio 3 exams?
- the day before the exam
 - the weekend before the exam
 - a week before the exam
 - constantly
8. Based on your experience in Bio 3, rank the following strategies (in order of importance, 1 been the most important) as being more effective in obtaining a passing grade in Bio 3:
- _____ attending lecture
- _____ reading the required reading
- _____ attending office hours
- _____ completing the homework
- _____ memorizing facts
- _____ gaining a conceptual understanding of the material
- Other _____
9. Based on your experience in Bio 3, rank the following strategies (in order of importance, 1 been the most important) as being more effective in obtaining an "A-A+" grade in Bio 3:
- _____ attending lecture
- _____ reading the required reading
- _____ attending office hours
- _____ completing the homework
- _____ memorizing facts
- _____ gaining a conceptual understanding of the material
- Other _____
10. Should effort be counted as part of your class grade?
- Yes
 - No
11. If your answer yes to question #9, how should effort be assessed?
12. Did your professional goal change after completing Bio 3?
- Yes
 - No

The following questions pertain to those students who obtained digital copies of lectures on CD-ROM:

13. How many lectures did you obtain on CD-ROM format?
- 1-5
 - 6-11

- c) 12-17
- d) More than 17
- 14. Did you use videotaped lectures to:
 - a) reinforce material
 - b) replace attending lectures
 - c) complete notes taken during lecture
- 15. In your estimation, were the videotaped lectures a valuable learning resource?
 - a) Yes
 - b) No
- 16. How many times did you listen and watch a videotaped lecture?
 - a) Once
 - b) Twice
 - c) Thrice or more
- 17. When did you listen/watch videotaped lectures?
 - a) after receiving the CD-ROM
 - b) a week before the exam
 - c) the weekend before the exam
 - d) the day before the exam

Appendix 2. Example of a Bio 3 exam question.

- 4) (10 pnts) X2 Syndrome, a congenital disease, is characterized by the failure of pancreatic cells to secrete insulin. Dr. Soto grew pancreatic cells from a X2 Syndrome patient *in vitro* and tested for the presence or absence of insulin precursor (mRNA) or protein in those cells. His results are shown on the following table:

Detected	Organelle
Insulin mRNA	Nucleus
Insulin protein (not modified)	rough ER
Insulin protein (modified)	rough ER, Golgi complex

Dr. Soto did not detect insulin protein in the media surrounding the pancreatic cells in culture. What organelle(s) or cellular structure(s) would you predict could be damaged (non-functioning) on those cells?

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Clinging to discredited beliefs: the larger cognitive story

Leah Savion¹

Abstract: A large body of research demonstrates the incredible power of initial conceptions, scripts, and stereotypes that result from our naïve theories. Prior knowledge compatible with information introduced by instructors enhances encoding and retrieval, but hinders learning when in conflict with it. Theories and facts contradicting existing beliefs are conveniently misinterpreted, treated as insignificant, or taken as valid only within the confines of classrooms. Belief perseverance—clinging to explicitly discredited beliefs—is ubiquitous to the point of serving as the ultimate evidence of the feebleness of our mind. Standard explanations in terms of supporting beliefs and affective-motivational components are partial at best. This paper proposes an explanatory model that illuminates the cognitive-adaptive sources of perseverance, demonstrating its inevitability given the general principles of economy and equilibrium that govern brain operations, the naïve theories we generate to make sense of the world, and the heuristics we employ to meet adaptive goals.

Keywords: belief-perseverance, learner's cognition, pet theories, active learning

I. What is Belief Perseverance?

Belief Perseverance labels the phenomenon of maintaining beliefs and theories against explicit conflicting evidence. Examples are abandoned in everyday life, science, and in experimental settings. Festinger (1956) tells about a small religious group's leader who predicted the destruction of the world by flood on a specific day, while only the faithful will be saved by a spaceman. In preparation for the trip, people quit their jobs and discarded valuable possessions. The flood did not take place on the designed day, but group members became more devoted to their leaders.

The theory of *Spontaneous Generation* provides a notorious example of belief-perseverance. Promoted by Aristotle, the theory that states that living things can arise from non-living material was maintained for 2000 years, supported by common observations (e.g., worm-like maggots appear on meat left out too long). Van Helmont, a well-known Belgian doctor, wrote in 1600 a recipe for making mice by throwing grains and old rags into a room corner. In 1660 the Italian doctor Redi challenged the theory by leaving meat in open and in closed containers, and getting maggots only in the open ones. His conclusion—that maggots appear from eggs laid on the meat—was rejected on the additional assumption that air must be allowed to circulate freely in the closed jars for life to develop, since air carries some unknown “active principle” necessary for spontaneous generation to occur. An experiment that involved boiling the meat, thereby excluding the appearance of maggots, was rejected on the argument that “boiling destroys the active principle”. Redi then proceeded to cover the jars with a fine mesh cloth that allowed air to flow (but not eggs to be laid). The thesis of spontaneous generation gained popularity with the discovery of microorganisms, that are “made from food and water”, and was not rejected by science for a century after Redi's

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death. The “emotional long-term investment of scientists” cannot by itself account for the radical moves designed to maintain the theory against all evidence to the contrary. The following example illustrates that a long-term “incubation” of a belief is not necessary for its perseverance.

Ross (1975) presented three groups of people with the task of discerning authentic *suicide notes* from inauthentic ones. Group A was given highly positive feedback, group B was told that their performance was close to average, and group C received a low evaluation. Upon completing the task, all subjects were told that the evaluations did not correspond to their performance but were manipulated beforehand as part of the experiment. They were all shown the experimenter’s written instructions that specified the feedback to be given to each arbitrarily selected group. The subjects were then asked to evaluate, in a post-experimental questionnaire, their performance on the task as well as to rate their ability in suicide-note discrimination cases. Perseverance was quick to raise its ugly head: those who were pre-assigned to success reported evaluations far higher than the others, and the opposite evaluation was self-assigned by the “failing” subjects.

What tricks do we employ in order to maintain exposed false beliefs?

The standard devices we use normally “abuse” the incoming discrediting information: we treat it with deliberate misinterpretation that renders it either irrelevant to the belief in question or even as confirming evidence; or we assign low weight to it, ignore it completely, or confine its validity to a convenient “paradigm”.

The Usual Suspects: Prevailing “folk-psychological” explanations for belief perseverance range from misunderstanding, ignorance, embarrassment of admitting being wrong, cognitive “laziness”, stubbornness, or emotional considerations, all the way to stupidity and sheer irrationality. The phenomena of belief perseverance are so ubiquitous, that it is often used as the ultimate evidence of the feebleness of our minds, the illogical aspect of human thought, and the futility of formal education. It is commonly considered a temporary mental disorder in the processes of belief acquisition and maintenance, and thus can and should be removed at any price.

More promising attempts link the phenomenon with “confirmation biasing processes” of evidence stored in the memory (Nisbett & Ross, 1980), or with “hypothesis-confirming” retrieval mechanisms (Snyder & Cantor, 1979). Lepper (1986) mentions the “Fundamental Attribution Bias” as a contributing causal component, and hints that the selective and constructive nature of our memory may be at fault, but mostly puts the explanatory burden on the formation of supportive causal scenarios: “People spontaneously generate explanations for events as a way of understanding events, including their own beliefs. If an explanation is generated, this explanation becomes a reason for holding an explained belief, even if the belief is eventually undercut by new evidence” (Shultz, 2001). Fleming (1979) demonstrated the reduction of belief perseverance in subjects that were not given an opportunity to generate causal explanation. The demonstration indicates that belief perseverance has deeper roots than what folk psychology alludes to, but it only shifts the burden to accounting for the perseverance of the causal explanation. These hypotheses leave the most interesting questions unanswered: (i) How can the belief persevered be acquired if all its supporting explanations are produced in retrospect? (ii) Why would the explanations have cognitive salience that accounts for their sustainability? (iii) What are the cognitive mechanisms responsible for the acquisition and maintenance of the type of beliefs persevered? (iv) What can we do about them?

Belief Perseverance is a convenient label for a complex phenomenon, whose long-term expository investigation by experimental psychologists yielded explanations that fail to

couch the phenomena within larger rubrics of cognitive operations, or lead to effective remedies. Instead of dismissing belief perseverance as a peculiarity of the illogical mind, or shifting the burden of perseverance to other beliefs, this paper attempts move from what Ramachandran calls the “phenomenon-driven stage” to the “theory-driven stage” by understanding the sources and the adaptive value of belief perseverance and ways of combating this tendency that are compatible with the workings of our brains.

II. The Big Picture.

Question: "What forces act on a coin that has been tossed straight up in the air?" The correct answer: only the force of gravitational pull toward the earth acts on the coin, once it is airborne. Alas, 70% of college students who had completed a course in mechanics in MIT gave the same answer as students who had not been exposed to any mechanics or physics training: they cited two forces, the downward force of gravity and "the original upward force of the hand". Most people also believe that the change in seasons is a direct function of the distance of the earth from the sun, that the process of evolution brings species gradually to the ideal of perfection, and that economically good times are associated with low interest rates. These beliefs are part of our "pet theories" – cognitive construct that are inevitable by-products of growing up, and are amazingly resistant to change under the influence of formal education (see Figure 1).

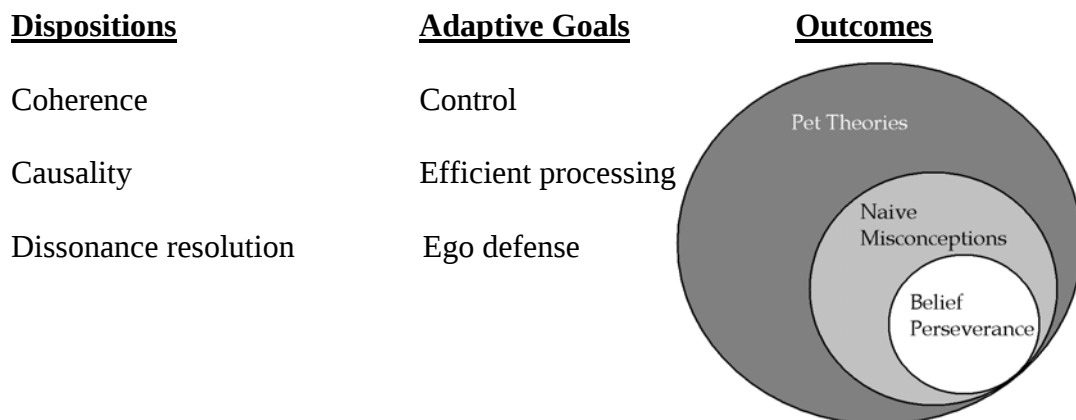


Figure 1. Dispositions, Adaptive Goals, and Outcomes.

Our minds are not “blank slates”—they are densely populated with incredibly powerful initial conceptions, naive views, scripts, and stereotypes that we form from experience in order to make sense of the world. We are driven by *dispositions* necessary for survival: finding causal relations between events, generating a coherent picture of the world (with generalizations, analogies, stereotypes, and convenient “gap-filling” hypotheses), and most notably—eliminating cognitive and emotive dissonance (with belief confirmations and ego defense mechanisms). These dispositions aim at meeting our *adaptive goals*, among them increasing control over the environment by enabling correct predictions of events, processing huge amounts of information rapidly with the least amount of cognitive investment, and protect our fragile ego from injury. Because we are predisposed to find coherence, meaningfulness, and order, we end up imposing theories on inherently random phenomena and build complicated schemas. The interaction of our dispositions with innate skills and experience generate one of the most robust tools we have for meeting our adaptive needs: pet theories. The term “theory” generally refers to a consistent set of interrelated propositions that have an explanatory power for a certain physical, social, philosophical, or mental

phenomenon, and lead to predictions commonly supported by experiments. Pet theories rest on personal experience, not by controlled experiments; but just like scientific theories they have explanatory and predictive functions.

Why do we construct pet theories?

We develop intuitive theories involuntarily from a very early age as part of our *evolutionary survival kit* in an attempt to establish better control over our environment, produce causal connections and coherence in our experiences, and draw analogical inferences and generalizations from them. The process of acquiring knowledge starts, at the latest, soon after birth. Infants show amazing ability to distinguish among forms, faces, and visual and auditory patterns; to discern focal from marginal colors; and to pair up an object they have seen with one they touch. A three-week old baby can associate a loud sound with bright colors; a three-and-a-half-month-old realizes that objects continue to exist after they move out of sight, and that two objects cannot occupy the same space; at six months babies distinguish groups of two from groups of three objects; and at one year children show understanding of some principles of causality.

During the first years of life children master a large host of competencies without instruction: they manage to recognize and keep track of many faces and objects, they learn to talk, sing, dance, joke, play ball, and manipulate toys, machines, and people; they become experts in deceiving and tricking others, and they notably develop a sense of fairness, truth, good, and evil. Along with these visible skills, children "invent" and develop complicated hypotheses about causal relations between physical and mental events, and about the nature of the external world, other minds, free will, moral judgments, the boundaries of knowledge, the "good life", rights and obligations, and "normal behavior". They also engage in intricate social relations with family members, friends, authority figures, and strangers. Without any formal training or even a source to imitate, children construct possible states of affairs in which they change facts, develop them, confirm or deny them, invent social situations, and make alterations to fit their naive conception. These early capacities and bits of knowledge accumulated from the surface features of experiences and meager inferential tools form the foundations for hypotheses about colors, sounds, quantities, and symbols, and about basic properties of physical objects, self, other minds, etc -- which in turn develop into pet theories.

Pet theories are the inevitable consequent of the ways information is presented to our senses, our disposition and biological need for ordering and controlling the phenomena of living, and the flaws in our information processing, intuitive assessments, and inference abilities that often illustrate the speed-accuracy tradeoff. They are based on surface features of the relevant concepts, rely on principles that emerge spontaneously, derived from everyday experience, commonsense, and intuitive generalizations, they are fragmented and often inconsistent, but seemingly well organized. Most are continually revised with use and with intellectual maturity, but they are not normally tested (voluntarily) against scientific theories or social facts, nor are they subjected to metacognitive tests, such as the attempt to detect inconsistencies, or to generate some closure of the relevant beliefs by drawing all their immediate or even just trivial consequences. These theories are complex, intricate, serviceable, useful, and partly correct, and in spite of their logical shortcomings, biases, and prejudices, they provide useful general frameworks for comprehending events, and for planning and encountering new facts or theories.

Pet theories have *naïve misconceptions* as the price tag for their pragmatic efficiency. These misconceptions often contain beliefs that are extremely resistant to change, and tend to emerge when the well-trained person attempts to apply formal instruction principles. *Belief*

perseverance takes place when certain naïve misconceptions are maintained in spite of full awareness of their falsity.

III. Partial Taxonomy of Perseverance.

Table 1. Types of Beliefs Persevered.

<i>The content range of beliefs that can be persevered</i>	
Content Type	Examples
General/Theoretical	Change of seasons is determined by proximity to the Sun
Particular/Pragmatic	Dietary supplements are essential for health
Social/Personal	Attribution fallacy

The range of contents of beliefs persevered is surprisingly wide (see Table 1). Some are highly abstract; others are theoretical with practical applications, such as “magical beliefs” and superstitions. Some beliefs relate directly to self-conception, e.g., the amusing and resilient “above average” belief we are better than the average person in positive traits (humor, intelligence, driving, or health), and below average in negative traits (being prone to biases). We persevere in believing that we control random events (the gambler’s fallacy), and that our tendencies and opinions are very prevalent among our peers (“false consensus”). Other persevered beliefs relate to social issues, such as social Darwinism, racist beliefs, stereotypes, or cultist beliefs.

Table 2: Ways of Discrediting a Belief (B).

Ways of Discrediting B		Examples
D1	Additional information dilutes the truth of B	Iraq’s possession of WMD in 2002
D2	B is exposed as a conclusion of a fallacious argument	Stereotypes, first impression, superstitions, racial discrimination
D3	Total evidentiary support for B is removed	Deluded self-assessment

D1. B is a relatively justified conclusion from certain premises, but additional information called for its removal (see Table 2). For instance, initial scarce evidence was sufficient to form the belief that Iraq has well-developed WMD in 2002, but later findings made this belief unjustified. A recent poll (Robertson, 2003), however, found that 34% of Americans surveyed still believe that these weapons were actually found in Iraq. Autism, to cite another sad example, was blamed on the mother’s attitude as late as 20 years ago. Contrary to all neurological evidence, many still persevere in that belief. Intervention in the form of exposing the believer to the “belief confirmation” heuristic, the overconfidence bias, or to other universal cognitive mechanisms she employs may alter the severity of the perseverance by jumpstarting its re-evaluation in lieu of the new evidence.

D2. B is the conclusion of a fallacious inference, such as false analogy, hasty generalization, or misapplication of correct rules. Many notoriously persevered beliefs fall under this classification: racial stereotyping, first impressions, the deterrent effects of the death penalty, sunk costs, and magical beliefs. D2 stems mostly from naïve misconceptions

about correct inferences (e.g., “false analogy”, “hasty generalization”, “ad hominem”), so perseverance could be reduced with education in formal logic.

D3. The total evidentiary support for B is removed. For instance: self-assessment beliefs in the “suicide notes” experiment, “imaginary infants” (the belief that blackouts, climatic disasters and even athletic strikes create a baby-boom nine months later), and many “ego defense” and self-assessment beliefs. Induced self-perception of efficacy promotes higher accomplishments and lower emotional arousal of stress (Bandura 1982), and persists against disclosure, as do our beliefs that we are aware of our beliefs and motivations, that we know the reasons for our emotional states, and that we can predict accurately what will make us happy.

D1 weakens the veracity of B, while D2 exposes a faulty logical relationship between B and its evidence. D3, which eliminates the justification for acquiring the belief B to begin with, seems to be the most problematic, since there is no “root” left to “uproot” and no process to correct. It is usually acquired from minimal, tentative, ill-founded evidence, which should be the easiest to nullify once proven false. No immediate remedy is visible for this type of perseverance, being the most enigmatic irrational product of our system’s prerogatives and so it calls for a deeper investigation of the cognitive forces behind it. Katz (1960) suggests that “the reasons for holding or for changing attitudes are found in the functions they perform for the individual, especially the functions of adjustment, ego defense, value expression, and knowledge”. The thesis proposes for attitude-change can be applied to belief-revision. Understanding the cognitive and emotive drives behind this kind of belief perseverance may illuminate to road to potential treatments.

IV. The Cognitive Story.

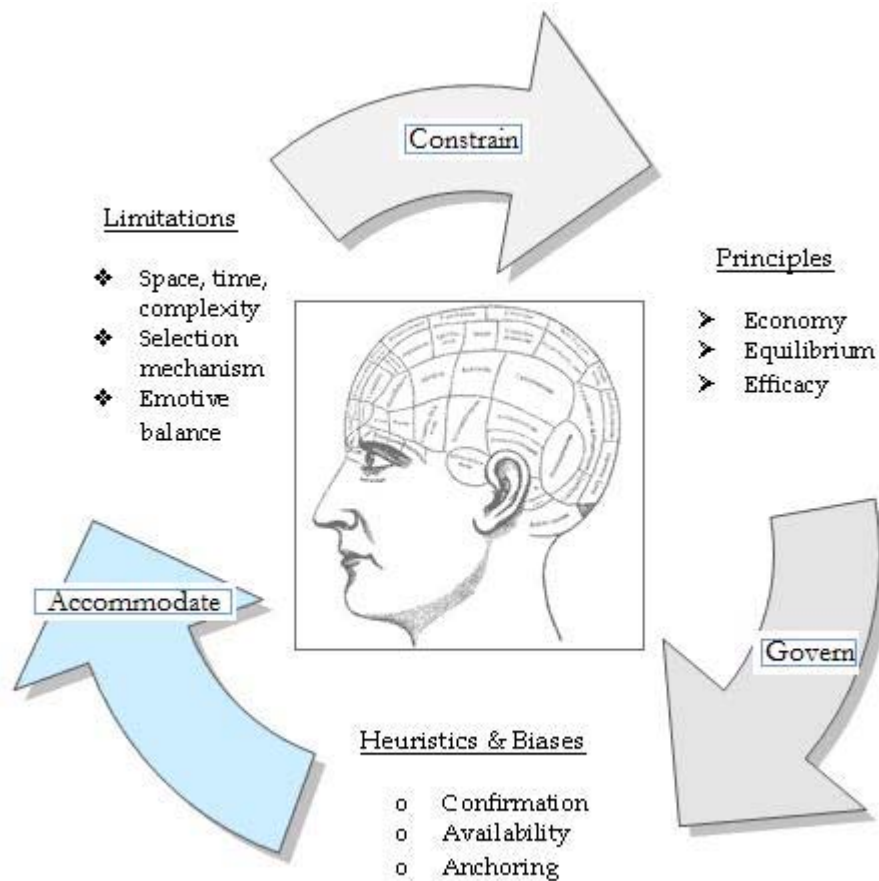


Figure 2. The Cognitive Story.

The world presents to us a messy array of incomplete, ambiguous, often unrepresentative data (see Figure 2). *Our Cognitive Machinery* displays amazing computational abilities, but is also limited by storage space, reaction time, by involuntary selection and search mechanisms, by inferential length and complexities, and by the need for continuous equilibrium to avoid stress. Our brain's operations are constrained by its limitations and by the adaptive goals of the organism. *Cognitive economy* leads to the tradeoff of accuracy for quantity of information and speed of processing. This tradeoff dictates the employment of information-processing heuristics that allow simplification and easy categorization. *Cognitive equilibrium* engages heuristics to fulfill dispositions such as coherence, control and understanding. It is part of a larger psychological immune system (Wilson, 2005) designed to reduce dissonance, balance resource management, maintain default positions, generate and sustain an ego.

Belief perseverance is supported by heuristics such as belief confirmation, anchoring, and availability, and by biases such as overconfidence. *Confirmation bias* names our fundamental tendency to seek and incorporate information that is consistent with our current beliefs and theories, while avoiding, not comprehending, or putting less weight on ideas that potentially disconfirm our naive conceptions. People tend to over-rely on instances that confirm their beliefs, and accept with ease suspicious information. Evidence that seems incompatible with the pet theory is either discounted as irrelevant, explained away, or critically scrutinized and minimized. The *Availability heuristic* illustrates our tendency to judge the relative number of instances or the probability of an event by the ease with which relevant instances are recalled or imagined. *Anchoring* causes us to sticking to the initial presentation in the process of comprehension or problem solving, to the point of abandoning additional presentations that may be relevant. *Overconfidence* in our understanding,

memories and judgments is often the result of insufficient insight into the economical and equilibrium-driven ways we construct pet theories, and ignorance of the constructive nature of our memory. Overconfidence implies not only inaccurate comprehension and retrieval, but also failure to recognize the need to improve.

V. Conclusions.

This paper proposes an explanatory model of belief-perseverance, which links basic cognitive adaptive needs with the tools we bring to bear on our survival tasks. These tools, cognitive heuristics, create pet theories that contain naïve misconceptions and false persistent beliefs that all contaminate all cognitive systems. The mind's governing principles cause inevitable trade-offs between quantities of information, speed of processing, accuracy, and dissonance-avoidance, resulting in a costly maintenance of faulty prior knowledge and inadequate long-term learning. Belief perseverance is anchored in adaptive principles and operations of the mind: it is an inevitable result of otherwise effective mechanisms, and its removal is not always beneficial to the system as a whole.

What happens when the naïve meets the “sanctioned”?

Formal instruction in concepts, theories, and explanations often contradict the basic assumptions and predictions of our unscientific intuitive models. The result of presenting the new knowledge to the resisting old "knowledge" is usually manifested in one or more of the following:

- The new information is either discarded wholly or partially, usually deemed "incomprehensible" or totally irrelevant.
- The new information is altered so that it is given an interpretation that fits the pet theory; the mix of the old with the incompatible new is normally carried out in logically unscrutinizable ways.
- Some people reluctantly adapt the new theory as a "school bound explanation," while holding on to the incompatible familiar knowledge as reliable and relevant outside academia. The new formal knowledge is perceived as confined to what is required in school, but as not applicable in daily life.

How do we kill the beast?

The theoretical model outlined here offers directions for answers to the puzzles associated with perseverance: beliefs are acquired because they 'fit' with the relevant pet theory, and they persevere due to being well situated in the set of naïve misconceptions to the point of creating an economical or equilibrium havoc upon removal. "Many of the mechanisms that distort our judgments stem from basic cognitive processes that are usually quite helpful in accurately perceiving and understanding the world", writes Gilovich (1991, p. 10). Cognitive principles and their heuristic soldiers are responsible for our normal success in achieving daily tasks and are also behind the resistance to change beliefs that are well incorporated into the web of beliefs, and whose removal may damage the system as a whole.

Understanding the sources and the necessary functions of pet theories and our cognitive principles are prerequisites for successful belief modification. This understanding can be enhanced by examining these forces in class as part of the course content, and by devising "student-centered" teaching strategies, which emphasizes process over product, and rest on the assumption that learning is by nature an active endeavor, as displayed by the

construction of pet theories and their constant (mostly unconscious) development. Student-centered instructional techniques satisfy our dispositions for control (over the learning process) and for coherence in our world-view. They tend to alleviate anxiety, enhance motivation, and promote the use of metacognitive skills of awareness, reflection, monitoring, and revising learning outcomes.

A teacher centered instructional style gives the student little opportunity to respond immediately to the instruction. The teacher proceeds upon assumptions about the students' prior knowledge, skill level, motivation, common vocabulary, and level of comprehension. Errors in these hunches often lead to faster or slower transmission of material than appropriate, to making the content too difficult or too easy, and to an engagement with the material as "school bound" content to be memorized verbatim. The students become frustrated, apathetic, dependent, and unmotivated. Instructional devices, which sustain learning for understanding rather than for repetition and memorizing, prove crucial for significant learning outcomes.

The following proposes several student-centered instructional techniques:

- **Student's dialogue** with herself: reflect about the topic; keep a daily journal or develop a learning portfolio of what she studied, how, and its effect on her.
- **Dialogue with others** in intense small groups, clearly instructed.
- **Observe** or listen to others performing or solving a content problem.
- **Doing**: critique, investigate resources, give a presentation, role-play, develop a questionnaire, or compose a test.
- **Design** an experiment, conduct a band, propose research topics, or identify the principles of a good paper/presentation/task execution.
- **Think-pair-share**: the students reflect briefly on an issue, discussed it with a peer, they formulate a correct response and share with the class as part of a formal discussion.
- **Cooperative learning**: activities done in groups of three or more students, usually assigned complex tasks such as research projects or presentation.
- **Collaborative learning**: classroom strategies involving an equal collaboration of students and instructors, for instance designing tests or choosing reading materials.
- **One-minute paper**: a short written exercise or response to class material or teaching techniques, e.g., "what was the muddiest point in today's class?"
- **Response** to class material (on the board, paper, e-mail, chat room): "I'll remember from today's class that...", "I was surprised to learn today that..."
- **The Socratic method** utilizes questions to test comprehension and increase students' involvement: a chosen student is presented with a question, then another, till the full answer is provided (works best after a quiet wait time).
- **Summarize another student's answer** is a technique to promote active listening.
- **Brainstorming** takes place when the class as a whole is asked to make as many suggestions as possible as a response to a well-designed question.
- **The fish bowl** is where students deposit their (single) clarification or application question concerning class material, and the instructor or other students respond to them later.
- **Note comparing** and sharing can help students develop note-taking skills.
- **Concept mapping** in cooperative work demand identifying and organizing knowledge meaningfully by defining the connections between terms/concepts covered in class and integrating them systematically. The results are usually visual representations, such as flowcharts, models, diagrams, drawings, or networks of ideas.

- **Jigsaw group project** require each member to complete a discrete part of an assignment, rendering each a content-specific expert; upon completion the group reforms to put the pieces together.
- **Panel discussion** can be combined with a jigsaw group project: each member presents her findings, and is expected to respond to questions from the audience.
- **Debates** and **role-playing** are effective when the subject matter lends itself to clearly opposing views, and when the exercise is highly structured.
- **Case study** allows for an open-ended story as a vehicle for analysis, criticism, decision-making, and application.
- **Reciprocal peer questioning** requires students to prepare questions about the material, discuss with their study group, and select one question from each group for sharing with the class.
- **Spontaneous group dialogue** starts with (secretly) assigning distinct roles to a few students (discussion leader, opinion, seeker, disagreeer, expert, fallacious thinker, skeptic), while the observers to the dialogue they actors produce have to identify the roles, biases and mistakes, levels of knowledge, understanding, and leadership; ethical conflicts, logical deviations, ambiguity in the material presented, the need for further research etc.
- **Student-led review sessions** works best when students are instructed to prepare and post questions, and are expected to volunteer to provide answers to some of the others' questions.
- **Class research symposium**, akin to professional meetings, can take place publically (with invited students and faculty) to demonstrate research projects generated by the whole class or several groups.
- **A newsletter** can be produced and written by students about specific topics related to class content; it may include published articles, student papers, or information about related public events.
- **Thought-provoking findings** can be posted by students and the instructor in the course forum site. The posting share interesting bits of information, discoveries, scientific and social news, and encourages responses.

The most robust devices for overcoming belief-perseverance can be called “*super active learning*” techniques (see Savion 2005 for details). They include, for instance, assignments that call the student to function (temporarily) as a teacher. Such assignment may involve in-class teaching of specific material to a group, pairing students from upper and lower class as “tutoring” units, or assign the teaching (and reporting) of a difficult concept to an outsider. The benefits of incorporating appropriate teaching techniques that render your student into a teacher include:

- Reduction of well-embedded misconceptions that normally inhibit the acquisition of the academically accepted theories and explanations.
- Familiarity with one's own learning styles and possibly the development of cognitive flexibility, such as moving from the serialistic style to the holistic style when coping with new material.
- Development of metacognitive skills, including awareness of one's approach to problem solving, monitoring of the process, and revising unsuccessful methods when necessary.
- Critical awareness of diverse (even wrong) approaches, which enriches one's understanding of complex material, and helps prevent future mistakes.
- Understanding of different levels of understanding, e.g., as demarcated by the abilities to summarize, criticize, analyze, synthesize etc.

- An appreciation of the distinction between knowing and being able to teach properly, and of the role of the instructor as facilitator of comprehension via active learning.

Teaching involves preparation, deep engagement with the material, awareness of oneself as a learner, realization of muddy spots and less intuitive constructs, thinking “on your feet”, and having a well-developed theories of other minds. More often than not, these techniques help significantly in reducing the phenomenon of belief perseverance on the part of the provisional teacher. The awareness of the intuitive and adaptive value of our worst prejudices and persistent follies and their place in the larger cognitive picture of the mind’s operations can have a robust effect on our self-understanding. We may be able then to establish effective intervention techniques to reconcile the academically sanctioned with the pre-existing beliefs by learning how to map the new concepts, ideas, and observations onto the network of the naive conceptions that produced perseverance, and how to overcome them in accordance with the ways our minds work.

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Pedagogy of reflective writing in professional education

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Abstract: Educators in professional programs are challenged to utilize pedagogical approaches that best prepare students with knowledge, values, and skills for professional practice. Providing academic content alone may not provide the problem-solving skills necessary for practice in a complex world in which practitioners must analyze, evaluate, and revise knowledge. Thus, reflective process becomes a core skill for functioning effectively in a diverse and complex practice environment. Analysis of data from focus groups with social work students is presented. Implications for using reflective writing are discussed as a pedagogical tool for preparing students for professional practice.

Keywords: professional education, reflective writing

I. Introduction.

Professions such as social work, nursing, medicine, education, and others face myriad challenges as society continues into the twenty-first century. The complexity of social problems encountered by professionals demands the evaluation of information from multiple sources as well as the ability to translate knowledge into action. Higher education is charged with the task to prepare professionals with the ability to develop skills in practical reasoning in order to make sound professional judgments (Sullivan and Rosin, 2008). This paper examines the pedagogy of reflective writing from one professional discipline, social work. Social work *practitioners*, for example, are challenged with promoting the well-being of society through social change (NASW, 1999). Social work *educators* are challenged to promote life-long learning that embraces knowledge and skills for professional practice (CSWE, 2001). This has implications for educators from other professional disciplines.

Educators in professional programs must use pedagogical approaches that prepare students with knowledge, values, and skills to meet the emerging challenges for practices in their respective fields.

The best professional pedagogies develop informed practical judgment that students will need in their careers by introducing them to the traditions of knowing and acting that distinguish their future professions. These pedagogies create bridges between theoretical knowledge and the demands of uncertain situations (Sullivan and Rosin, 2008, p. 45). Mere exposure to content does not instill learning that provides the sophisticated problem-solving needed in a complex world where practitioners must continually analyze, evaluate, and revise knowledge in the context of ongoing practice experiences (Weimer, 2002). Reflection, therefore, becomes a critical skill for functioning effectively in diverse and complex practice realities.

Scholars (Dewey, 1910; Freire, 1973; Knowles, 1980; Kolb, 1983; and Schön, 1983) have examined learning processes such as experiential learning, adult learning and reflective processes in higher education. These works provide educators with a framework for facilitating

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learning processes in the classroom. However, helping students integrate knowledge with the realities of practice continues to challenge educators across professional disciplines (Burnett, Phillips, and Ker, 2008; Kinchin, 2008; Ireland, 2008; Knight, 2001). The process of analyzing and integrating knowledge through reflection processes is a lifelong learning skill for all professional disciplines, including social work (Lay, McGuire, and Grise-Owens, 2006).

One pedagogical strategy educators of professionals may utilize for encouraging self-reflection and critical thinking is the *reflection paper*. “Reflective writing ... focuses on the writer’s learning experience itself and attempts to identify the significance and meaning of a given learning experience, primarily for the writer” (Fink, 2003, p. 117). In higher education, the term paper has traditionally been the standard (and sometimes only) product to demonstrate the outcomes of student learning. Although such an assignment may well demonstrate knowledge in a particular content area, it may not require students to be able to develop insights into their own biases or demonstrate the ability to integrate that knowledge with the specific application in actual practice. Reflective writing has the potential to facilitate both self-reflection and integration of theory and practice. It also shows promise in assisting students in identifying the connection between personal experiences and professional values (Walmsley and Birkbeck, 2006).

However, not all reflection is created equal. Educators have been interested in the development of reflection as a part of higher-order thinking in intellectual development (Perry, 1970). Yet, reflection is not often defined in a way that provides educators and learners with a structure for thinking or clear guidelines for evaluation (Brookfield, 1995; Fisher, 2003). When asked to write reflectively, educators and learners may associate it with free thinking, without structure or purpose. Although unstructured reflection may be useful, it does not explicitly prepare the learner with the analytical skills necessary for practice in a complex world. Reflection that *prepares* includes, “...a process of critical examination that involves challenging assumptions, testing the logic of conclusions, considering multiple perspectives—not merely identifying facts and feelings...” (Clayton, Ash, Bullard, Bullock, Moses, et al, 2005, p. 14).

This paper provides a theoretical framework for using reflection papers across the professional social work curriculum that provides structure and encourages critical thinking. Results from student focus groups on reflective writing are presented, providing preliminary evidence for the usefulness of this pedagogical strategy.

II. Theoretical Framework.

Concepts of reflective learning are not new to the pedagogical discourse on higher education. Dewey (1910) defined reflective thought as “active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends” (p. 6). The theoretical framework to support the pedagogical strategy of reflection papers includes: 1) concepts of adult education; 2) experiential learning; and 3) critical thinking in writing.

A. Adult Education

Concepts of adult education are relevant to professional disciplines in that often students tend to be non-traditional. For example, 60% of full-time and 70% of part-time graduate social work students are over the age of twenty-five (CSWE, 2007). In addition, approximately 33% of

all undergraduate social work students are over twenty-five (CSWE, 2007). These adult learners bring a wealth of experience to their professional education that may be maximized through reflective writing.

Traditional models of education have utilized a “banking model” (Friere, 1973, p. 72) where the student is viewed as an empty vessel to be filled with academic content by the expert teacher. However, Friere (1973) challenged the traditional roles of student and teacher, emphasizing collaboration between co-learners. Concepts of dialogue and reflection are significant in a Friirian (1973) model of adult education. Knowles (1980) underscores the importance of andragogy and the active involvement of the student in the learning process. Learning then must be mutual, reciprocal, and simultaneous (Roche, Dewees, Trailweaver, Alexander, Cuddy, and Handy, 1999) and this is particularly relevant for the adult learner.

Boud (2001) highlighted the importance of reflection in the learning process for adults by positing that:

...learning is always grounded in prior experience and that any attempt to promote new learning must take into account that experience. All learning builds on existing perceptions and frameworks of understanding; therefore, links must be made between what is new and what already exists if learners are to make sense of what is happening to them (p. 11-12).

Reflective processes that identify and explore those links should be emphasized in teaching adult learners. “An essential teaching task is to develop connections between the “abstract world” of concepts with the “real world” of personal experiences” (Gitterman, 2004, p. 96). Adult learners require an opportunity to examine their experience in the context of a dialogic process (Knowles, 1980). For example, social work students who have previous experience working in public child welfare may have been utilizing theoretically based interventions for many years without knowing or understanding the theory from which they were derived.

B. Experiential Learning

Inclusive of the literature on adult education, experiential learning provides an additional conceptualization of reflection in the learning process. Professional educational programs share the requirement of practicums and internships to prepare students to connect theoretical knowledge with practice. The roots of social work education are firmly grounded in the apprenticeship model (Frumkin and Lloyd, 1995) and practical experience is emphasized through the requirement of substantial practica hours at both the undergraduate and graduate levels. Thus, theories and concepts of experiential learning are historically central to the pedagogy of social work education.

Schön (1983) provided a link between experience and reflection for the education of professionals. He posited the implicit nature of reflection within the reflection-in-action process across many professions. “Reflection-in-action” (p. 49) has been integrated by social work educators as an accurate representation of how social work professionals operate in the “swampy lowland” (p. 42) of practice. Schön identified the gap between those realities of practice and the seemingly sure knowledge of the academy. Like other professions, social work has struggled to connect academic content to complex realities of practice. Reflection facilitates the continuous integration of knowledge, experience, and action.

C. Writing and Critical Thinking

In addition to the frameworks of adult learning and experiential education, another relevant area of literature is critical thinking and writing skills as a means to enhance learning in higher education. Critical thinking is a requirement for professional practice across disciplines. It may be defined as “the art of analyzing and evaluating thinking with a view to improving it” (Paul and Elder, 2006, p. 4). This requires reflection on thinking processes. As critical thinking has increasingly become a focus of undergraduate education through the general curriculum, professional programs may find students coming to their disciplines with critical thinking skills. However, educators are challenged to make expectations for critical thinking explicit in writing assignments and “...adopt teaching strategies that give students repeated, active practice at exploring disciplinary questions and problems” (Bean, 1996, p. 35).

Basic writing skills are also necessary for professional practice across disciplines and therefore, a requirement for professional education. Writing documents thinking processes for the purpose of examination. Fink (2003) has identified two types of writing for powerful college teaching: substantive writing, such as a term paper or essay, and reflective writing. Both in social work and adult education areas, the use of journals or diaries to promote reflection have been suggested (Boud, 2001; Cullen, 1981; Sullivan and Bibus, 1990). Most of the tools identified previously are more student-directed and unstructured. These types of assignments allow students to have a broad focus however, lack of structure and focus in reflective writing is not likely to promote critical thinking (Brookfield, 1995).

The literature on adult education, experiential learning, and critical thinking/writing skills provide a theoretical framework for the utilization of reflective writing as a pedagogical strategy. The nature of professional disciplines requires practical connections between academic content and diverse practice settings. Adult learners, who are well-represented in both undergraduate and graduate professional education, benefit from opportunities to connect their life experiences to new academic content from classroom and field assignments. Reflective writing provides opportunities to integrate student thoughts and experiences with academic content. Thus writing and critical thinking may become linked in the teaching-learning process. Reflection papers may challenge students to utilize and improve their critical thinking skills for professional practice. This study sought to further illuminate the learning process in reflective writing from the student perspective.

III. Methodology.

The authors have utilized reflective writing as one among many pedagogical strategies. In reviewing feedback from university course evaluations for the past five years, the use of the reflection papers was often mentioned as a positive learning experience for students and facilitated integration of course content and reflective learning. However, it was not possible from the responses to open-ended questions from the course evaluations to determine why or how the reflection papers were effective in facilitating student learning. Therefore, a primary purpose of this study was to gain further clarification about how reflection papers may facilitate learning in the classroom setting.

This study focuses on student learning processes as related to reflection papers. For the purpose of this study, a reflection paper is defined as a reflective writing assignment that is focused upon a specific activity (a reading or group of readings, video, service learning,

practicum, role play, guest speaker, group activity, etc.) that highlights the student's learning from that activity.

Qualitative research methods, which included self-reflection and focus groups, were utilized in this study to gather and analyze information about reflection papers as a pedagogical strategy (Patton, 1990; Fook, 1996). In the spirit of reflective research (Fook, 1996), the authors began the process of studying the use of reflection papers by self-reflecting on the pedagogical purposes for utilizing them in social work courses. We identified multiple purposes, including: enhancing writing skills, dialoguing between professor and student on issues of difference and power, documenting student learning in experiential activities, and encouraging completion of reading assignments.

After reviewing course evaluations and completing the self-reflection process, questions were developed for focus groups to be conducted with students who had written reflection papers in social work courses. Research questions focused on how reflection papers facilitated student learning of knowledge, values and skills for social work practice. Questions included: "In what ways have reflection papers facilitated your learning experience?"; "In what ways did reflection papers help you to build your skills as a social worker?"; "In what ways did reflection papers help you to learn about social work values and ethics?"; "What were the drawbacks to using reflection papers?"; and "Is there anything else you would like to say about using reflection papers in social work classes?"

The research was approved by the university Institutional Review Board. Students from three courses were invited to participate in the focus groups after completing coursework where reflection papers were used as a teaching tool. These courses cut across curricular areas such as theory, practice and policy and included one 300-level undergraduate course and two graduate courses. The total number of students in these courses was thirty and all were invited to participate in the focus groups via an announcement in classes.

Three focus groups were facilitated by one of the authors who was NOT the instructor of the respondents. Discussions were audio recorded and transcribed. Authors independently conducted a content analysis (Weber, 1990; Padgett, 1998) on the full transcripts. This process included a line by line coding and subsequent grouping into categories as "meaning units" (Padgett, 1998, p. 76). The collaborative analyses included both inductive and deductive processes (Padgett, 1998) with end result being the final seven themes.

IV. Focus Group Result: The Student's Voice.

Three focus groups were conducted with a total of thirteen participants (n=13). Participants included males and females, undergraduate and graduate students from full, as well as part-time social work programs. All participants had recently completed a social work course in which one of the instructors assigned multiple reflection papers. Results from the qualitative evaluation of the utilization of reflection papers in social work education identified the following seven themes: 1) active participation/ classroom management; 2) dialogue with instructor; 3.) critical thinking; 4.) interconnections of theory to practice; 5.) professional identity/values clarification/self-awareness; 6.) improving written communication skills; 7.) and concerns with grading. Direct quotes from student respondents will be presented to support the identification of these themes.

A. Active participation in the course.

As the authors had identified in personal reflections on reasons for using reflection papers in many courses, students indicated that the papers facilitated their participation and engagement in course materials, both assigned readings and overall reflection.

“The reflection paper gave me my own way of participating in the class and not necessarily having to, ... if I didn’t have anything to say, it might look like I wasn’t participating, but then my reflection paper gave me another chance to say my piece...”

“...it helped me to keep in check and balance to make sure that I’ve been reading”

Adult learning theory supports the importance of active involvement in the learning process (Knowles, 1980). Social work students, as adult learners, bring a number of experiences, both personal and professional, that become the back-drop for their learning new content around social work values, knowledge and skills. For some students, this new learning may mean “undoing” old ways of working with clients or challenging values of traditional agency systems (Knowles, Holton, and Swanson, 2005). Reflection papers offer the opportunity for participation to every student, not just those who are comfortable speaking out in class. Reflection papers also provide a mechanism to encourage timely completion of course reading assignments which in turn facilitates learning.

B. Professional Identity/Values Clarification/Self-awareness.

The reflection papers had a clear role in facilitating self-awareness and an exploration of values/ethical issues for student respondents. Both of these are important aspects in the development of an identity as a professional social worker (Baretti, 2004).

“I think it has made me more aware of the things I do personally ... I guess a better understanding of myself in social work”

[The reflection paper]”... helped for me to define what my ethics were, when I was writing it.”

“I think in a few reflection papers, I monitored myself very carefully ... it helped me bring about an awareness because it was an area where I had a bias ...but knowing that someone else was going to read my thoughts – I didn’t change my thoughts, it’s just that I changed the way I presented them which helped me to change the way I think about the situation. Yeah.”

“It’s the nature of the reflection paper that allows you to, if you want to, to look pretty closely at yourself.”

“...it’s harder to do that but yet you learn more when you have to look at yourself as opposed to saying go research this topic and then write just a black and white paper.”

Professional education programs are concerned with the development a professional identity and the role reflection plays in its development (Clandinin and Cave, 2008; Urzua and

Vasquez, 2008; and Warnock, 2008). In social work, CSWE (2001) mandates that curricula include content on history of the profession, social values and ethics, diversity, and intensive practica during which students are required to participate in a professional mentorship process. This content is designed to promote the development of a professional identity. Despite expectations for social work education to provide professional socialization, there is little research that defines the concept of professional identity or seeks to understand it as a holistic process (Barretti, 2004). Some attention has been placed on the development and evaluation of value shifts that are expected to occur during social work education, however it is not clear as to how a professional identity develops (Abbott, 1988; Judah, 1976; Landau, 1999; Pike, 1996; Varley, 1966). Reflection papers seemed to have offered this opportunity for students to explore their professional identity, as evidenced by their comments above.

C. Personal Narrative/Dialogue with the Instructor.

Students appreciated the opportunity to dialogue with the instructor on challenging issues. They clearly listened to and appreciated the feedback offered by the instructor and the feedback provided reinforcement for the reflection process.

"I was surprised when I got the first one back on how many concepts she underlined and the details she made ... she actually went back and read it. And that also kept me alert to the quality of the paper I was turning in..."

...but I think that when you go back into graduate school, it should be learning and discussion through open dialog, and not just lecture, test, because that's not, I mean that's just retaining information to pass a grade, whereas reflections is, even if it's not verbal dialog, it's written and so you're kind of exploring ideas, which I think is what graduate school should be about."

"I guess the only thing I would say to (instructor) was that I mean that I'm glad that we do the feedback – that she gives us feedback from the reflection paper. I don't think you could do a reflection paper and not have feedback because I think that would just like defeat the whole purpose. You wouldn't even put the thought into it. And there were a lot of times where you know, her comments and stuff, even though they weren't directed to the answer, you know they were put in the form of a question. "Ahh, yeah! I didn't think about that!" And I would start to really think about something more deeply."

To the extent that professional socialization is facilitated by meaningful dialogue with instructors around course products, reflective writing provides a vehicle for enriching socialization. Reflective writings in this case were focused on relevant readings and topical areas of the students' current courses. In addition to expanding intellectual involvement with the material, engagement with course content was deepened through feedback on the writings. Students initially reflected on and developed analyses of topical areas and were then guided in deepening both their self-awareness and level and breadth of analysis through specific feedback from the instructor.

D. Critical Thinking.

Related to the earlier discussion on dialogue and narrative, student respondents seemed to value taking a second, and hopefully, more in-depth look at both what they were reading and their experiences in classroom activities, as well as their life experiences. Often, this process involved thinking critically about classroom concepts and deciding whether the classroom material made sense to them in light of their current or previous life experiences.

“I had to really reach down and find out what – what I would do and what I think”

“Well, I guess for me it helped with the information such as the readings because I tend to read really quick and then like let the story barely sink in. And then if I have to sit down and actually put it in writing, I also would go back and look at it so I’d know how it applied to me”

[The reflection paper] *“... kind of forces you to not only think critically, but forces you to almost have a stance, an opinion, and elaborate it.”*

Specific to the education of professional social workers, critical thinking has been added to the Educational Policy and Accreditation Standards of the Council on Social Work Education (2001). Gambrill (2005) has written a comprehensive text on critical thinking for clinical social work practice and Gibbs and Gambrill (1999) provided a workbook for social work education. It is difficult to know how social work education programs are implementing and monitoring the use of critical thinking skills among social work students. However, the reflection papers did appear to generally encourage deeper thought on course content.

E. Interconnections of theory to practice.

Consistent with the authors’ expectations regarding the utilization of reflection papers, students reflected the importance of integrating theoretical content with actual practice, whether it was combining the assigned theory with previous, current or even hypothetical clients. Students articulated the process of applying theoretical materials to personal or practice situations.

“...it helped me to figure out the situation and how to handle it using the step-by-step model and some of the steps we’ve had have given me more of a sense of control over things”

“application of the model because when we have a discussion paper on chapters, I tend to pick out solid points in the text on the how-to’s and then give a reflection on how I might have tried it”

Adult learners bring prior personal and professional experiences to their educational process so that both adult education and experiential learning theories would predict that providing the opportunity to make connections would enhance the learning of students. The reflection papers support and enhance this process by providing a focused opportunity with the “supervision” of the classroom instructor, which may be a precursor or concurrent learning experience for the practicum.

F. Improving written communication skills.

Although this theme was less pronounced than some areas, students indicated that the reflection papers facilitated academic writing skills, including APA style and learning to use of professional language.

"I turned out a 5-page paper one time ... I couldn't stop myself from writing because she wouldn't get the whole picture... But then I thought ... never write more than two pages."

"...it helped you get your feet wet writing again."

"It made us communicate, well, better, I think. It's supposed to be deep thought, contemplation, and once you know your values, you can articulate, gain concepts and articulate the knowledge."

"I thought it was the purpose of the reflection papers to...practice your writing skills and use it as kind of a playing field for APA... testing the waters about how to write in that style..."

Educators are challenged to involve a range of students who bring a wealth of lived experience to the professions, but may not have had primary/secondary educational experiences that challenged them to think and write critically. Also, students who return to the academy after many years of employment may face challenges in academic writing. Previous findings in social work education indicate that a substantial percentage of social work students struggle with writing (Alter and Adkins, 2001; 2006). Reflection papers may provide an opportunity for students to enhance their basic writing skills. It is important to note that some of the respondents in this study were discussing their experiences in their first graduate course, where the use of reflection papers explicitly had the intent of allowing students multiple opportunities over the semester to practice and improve their academic writing skills through multiple reflective writing assignments.

G. Concerns with Grading.

The first six categories identified positive aspects of the use of reflection papers. However, one negative category emerged: a concern with how the papers were evaluated and how grades were calculated for these writing assignments.

"...it would have been easier if all of the reflection papers would have been graded on a scale of one to ten, that way we could better assess how we were doing"

"I don't see where the critical grading, critique, etc. was consistent across the semester."

"She needs a rubric, that's what I am saying."

Initially, reflection papers were not numerically graded, based upon literature that identified a model of low-stakes writing where grading may interfere with the learning process (McKeachie, 2006). They were evaluated on a pass/fail basis and extensive feedback was given to encourage the reflection process; however, this approach seemed to be a concern for some

students who preferred more specific performance guidelines and scoring. The literature on teaching in higher education has struggled to provide criteria for judging writing and has debated the effectiveness of the use of scoring guides/rubrics (Bean, 1996; Mertler, 2001). Rubrics or scoring guides facilitate specific performance criteria as well as grading scales for students and instructors to evaluate learning (Mertler, 2001; Richlin, 2006) from writing assignments.

V. Discussion.

Students articulated the value of reflection for their learning, identifying the benefits of encouraging active learning, promoting self-awareness and professional identity, encouraging narrative and dialogue with instructor, facilitating critical thinking, clarifying interconnections of theory to practice, and developing professional writing skills. In addition, they identified concerns with how reflection papers were evaluated and graded. After reviewing the results, the authors also noted that reflection assignments did not consistently yield the full range of benefits identified by the participants. In continuing to employ the pedagogical strategy of reflective writing, the authors experimented with ways to increase the effectiveness of critical thinking to enhance learning. From these efforts, three strategies have emerged which appear to facilitate the reflective process to enhance learning: (a) structuring the assignment in order to facilitate the integration of experience and academic content, (b) the development of rubrics, and (c) fostering dialogue between student and instructor.

Structuring of the reflection process appears to be requisite for maximizing the positive qualities identified by students and also providing rigor that facilitates evaluation. This structuring includes providing specific prompts or questions to focus student examination of issues most relevant to course content. For example, in the graduate courses in which the respondents participated, instructions for the papers were initially very general: i.e. "write a two to three page reflection paper on the required reading or the videos shown in class". Some students were well able to identify their personal experience of the reading/video ("As I read the article, I was thinking about a the current practice reform occurring in our agency" or "As I watched the video, I realized my life would be very different if I had a physical or mental disability"), make a connection between their experience with the theories and models being studied, and connect that to what they would actually DO in professional practice. However, many students did not. The instructions for the reflections have subsequently become more structured, asking for specific information to highlight the experience ("What did you do?") as well as the learning that occurred as a result of the activity ("What did you learn and how will you use it?").

Secondly, this structuring leads to the development of clear guidelines for grading and the creation of rubrics. Rubrics are used to clarify expectations and make the evaluation process objective as well as collaborative. For example, in the undergraduate class on group work theory and practice, students were asked to address five major course concepts in each of the reflection papers that summarized the interaction of weekly in-class experiential groups. This structuring of the paper provides a means for evaluation of the learning. Rubrics provide the opportunity for connecting grading points to each of the concepts.

Finally, expanding and focusing instructor feedback given to students fosters an ongoing dialogue which enhances critical thinking. The feedback often involves the identification of common errors in critical thinking, such as inaccurate information, lack of clarity or judgments based on personal values. For example an instructor may note that clarification or detail is

necessary to substantiate a claim. The importance of feedback was mentioned by students and the authors note that students may comment on faculty feedback in class discussion as well as in subsequent papers, thus creating a form of ongoing dialogue.

VI. Limitations.

Although the content analysis of student responses indicates the value of reflection papers to explicate thinking processes for professional action, these findings are limited by the small sample of students from one discipline, at one university. Findings are focused on learning processes which in accordance with Schön (1983) assumes a connection between learning processes, learning outcomes, and practice which was not the focus of this study. In addition, it is not known whether the experiences of social work students are similar to students in other professions, such as nursing, medicine or education.

However, these results may be used to develop additional measures to investigate reflection papers or the utilization of rubrics to evaluate specific outcomes to student learning including cross-disciplinary research. In addition, this research did not explore the role of faculty in providing quality feedback to students. Further research will be needed to generalize the findings of this research to social work education or other professional education programs.

VII. Conclusion.

Schön's (1983) work developed partially as a correction to the seemingly dominant approach of "technical rationality" (p. 21) for professional practice, contrasting the reflective practitioner with the expert professional, the managerial professional or the practical professional. What was true in the 1980s is certainly still true today. Professionals in all disciplines must be equipped with the ability to rigorously reflect on their practice in a changing world as well as manage the complex technical requirements of professional practice. This includes being conscientious consumers of empirical data for the purpose of employing best-practices while continually reflecting on one's own practices utilizing critical thinking skills.

With the expansion of online courses in professional education, which often involve student and faculty dialogue, both synchronous and asynchronous, reflection assignments offer a potential pedagogical strategy to facilitate student learning. Reflection papers seem to hold promise as a teaching tool, which stimulates student self-reflection and enhances critical thinking skills in the learning process. Research must continue to focus both on learning processes, outcomes, and the connection to practice. Given the demands of all the professions in a constantly changing global environment, reflection is both a pedagogical strategy as well as a valuable skill to support effective professional practice for the future.

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Touching your students: the impact of a handshake on the first day of class

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Abstract: Can a simple handshake on the first day of class change student impressions of the instructor and the course? We compared students who received a handshake to those who did not at the first class meeting and evaluated teaching skills, instructor's ability to motivate student interest, and instructor's support of students as a function of touch group and instructor gender. Our findings revealed significantly higher ratings for female instructors than for male instructors when they shook hands, with these differences specific to ratings of instructor skills and instructor's motivation of students. In addition, students with whom male professors shook hands actually rated their professors lower on teaching skill and ability to motivate than those with no handshake. Thus, female professors may establish immediacy through the touch of a handshake, but male professors should avoid this seemingly innocuous touching of students.

Keywords: teaching, touch, handshake, student motivation, teaching evaluations, instructor gender, college students, immediacy

Mehrabian (1969) defined immediacy as psychological availability or closeness, with behaviors regularly categorized as either verbal or nonverbal. When immediacy is applied to the classroom, verbal behaviors include calling on students by name, encouraging students to talk, and asking for student input on assignments (Gorham, 1988). Nonverbal classroom behaviors generally include smiling at students, making eye contact, and moving around the room while teaching (Andersen, 1979). Although both verbal and nonverbal immediacy behaviors correlate with increased motivation (Frymier, 1993; Wilson and Taylor, 2001), higher student grades (Wilson, 2006), and more positive attitudes toward the course and professor (Witt, Wheelless, and Allen, 2004; Wilson and Taylor, 2001), the verbal scale has been contentious. Robinson and Richmond (1995) suggested suspending use of the verbal scale because it measures "teacher effectiveness" rather than immediacy, and subsequent research revealed several factors of teaching represented on the verbal scale (Wilson and Locker, 2008).

Among the nonverbal behaviors offered by Mehrabian (1969), the teaching literature virtually ignores touch as a way to build rapport between teachers and students, even though touch represents the most obvious method to foster closeness. In fact, touch was part of the original immediacy scale, but teachers found it too controversial. Crump (1996) asserted that college professors should try hard not to touch students due to potential misinterpretation as sexual harassment. Nonetheless, Richmond, McCroskey, and Johnson (2003) subsequently found the idea of touch to be so compelling that they returned it to the nonverbal immediacy scale.

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Regardless of whether touch remains on the scale, most American teachers assert that touch is not necessary and may risk their reputations and perhaps their careers.

Students also seem to believe that teacher touch is negative. When asked their view, students disagreed with the statement “I like it when a teacher touches me” as indicated by a mean rating of 2.00 on a 1-5 scale, with 1 representing strongly disagree ($N = 150$, unpublished data). However, research indicates that student responses to touching contradict established beliefs. Guéguen (2004) exposed some students to brief touch on the forearm during a statistics exercise and found that students were more likely to volunteer for class participation if they were touched. In addition, Steward and Lupfer (1987) found that touching students twice on the arm during a post-test interview resulted in higher grades on the subsequent course exam. Further, students who were touched rated the professor more positively.

Student responses to touch often fluctuate based on both student and professor gender. Sanderson and Jorgensen (1997) examined all four possible gender combinations and reported the least appropriate combination (based on student ratings) to be a male professor touching a male student, followed by a male professor touching a female student, with the best pairing represented by a female professor touching a female student. Similarly, Rester and Edwards (2007) reported that excessive immediacy, which included touch, was seen as caring when offered by female professors but controlling when offered by male professors. Student gender did not moderate these effects.

Prior research employed touches to the arm, shoulder, and thigh, primarily. With the exception of the thigh, most touch situations seemed normal and authentic to the situation. However, all of these touches were from the professor to the student such that the student did not play an equal part in the touch. Perhaps as a result, students felt a loss of control when a male professor instigated touch. A common type of touch that allows more equality between the professor and student would be a handshake; although the handshake originates with the professor, the student is equally involved in the touch.

In our study, male and female professors either shook hands with students as they entered the classroom or did not shake hands with them. At the end of the first day of lecture, students rated their attitudes toward the professors and the course. In addition, they reported their attitudes toward touch. After removing variability associated with attitudes toward touch, we expected to find that students would have more positive attitudes toward female professors with a handshake than without; however, the opposite was expected for male professors. Because the majority of students in psychology courses are females, we did not expect to reveal an effect of student gender.

I. Methods.

A. Participants.

Students enrolled in four introductory psychology courses at three institutions in the southeastern United States participated in this study. The courses were conducted during the summer and fall of 2007. There were two female and two male instructors who taught the courses, with enrollments between 16 and 40 students each. One hundred and five students were present on the first day of class and were randomly assigned to the experimental conditions and completed surveys. Because 15 students indicated that they had met the teacher previously, their data were removed from the data set for final analyses. Ninety students (72 women and 18 men

with an average age of 19.50; $SD = 2.34$) completed the two surveys at the end of the class period who had no previous experience with the instructor ($n = 82$) or met the instructor once during new student orientation ($n = 8$). Ethnicities included 44 Caucasians and 44 non-Caucasian (predominantly African American) students. There were 41 first-year students, 19 sophomore students, 17 junior students, 12 senior students, and one student of unknown classification.

B. Materials.

A two-page survey was handed to the students as they entered the classroom at the beginning of class period, which they were instructed would be completed in the last 20 minutes of the class period. On the first page of the survey, students rated statements about their attitudes concerning the instructor (e.g., “The instructor seems like an excellent teacher”) and the course (e.g., “I expect to learn a lot in this course”), on a 5-point Likert-type scale (Strongly Disagree to Strongly Agree). Three items (opinion of the overall course, opinion of the effectiveness of the instructor, and overall opinion of the instructor) were scored on a 5-point scale from “Poor” to “Excellent.” Questions about the instructor focused on the teaching skills of the instructor, the degree to which the instructor can motivate or interest the students, and the degree to which the instructor likes or cares for the students. The first page of the survey included questions that requested demographic information about participants (age, gender, ethnicity, year in college, etc.). On the second page of the survey, students indicated their attitudes about touch on a 5-point Likert-type scale (Strongly Disagree to Strongly Agree). Questions focused on the students’ general attitudes about touching (e.g., “Touching is not okay,” “Touch is healthy”), their personal preferences about touch (e.g., “I prefer not to be touched often,” “I touch people often”), and attitudes about teachers touching students (e.g., “I like it when a teacher touches me”, “It is okay for a teacher to touch his/her students”), including three reverse-scored items (“Touching is not okay,” “It is not okay to touch people,” “I prefer not to be touched often”).

C. Procedure.

Before the first day of class, the instructor prepared the two-page survey by folding it in half and taping or stapling it shut. The instructor then made an inconspicuous mark to designate whether the instructor would shake the student’s hand before handing the survey to the student. For example, a light pencil stroke was made on the back corner of the survey that was to be given to students with whom the instructor would shake hands.

On the first day of class, the instructor met students as they came into the classroom. As students entered, the instructor greeted the student, using a standard phrase such as “Welcome to the class” or “Welcome, my name is [instructor’s name],” using the phrases in a random order. At the same time, the instructor either shook the student’s hand and handed the survey to the student or simply gave the survey to the student. The student was then instructed not to do anything with the survey until the end of class. Once the time for class arrived, the instructor finished greeting students and proceeded to start class. General first-day-of-class activities occurred, e.g. handing out the syllabus, giving an overview of the course, introducing some material. In the last 20 minutes of class time, the instructor gave instructions to the students about completing the survey, appointed a student to collect the surveys when everyone had completed them and get the instructor, and then left the room. When the students had completed the survey, and the instructor reentered the classroom, the instructor discussed the study and used

it as a tool to introduce research methodology in psychology. Follow-up questions during the discussion indicated that students did not know the nature of the manipulation or the purpose of the study when they were filling out the survey. Students were also asked to see the instructor if they had concerns about the study or did not want their information discussed outside of the classroom, and the study was approved by the IRB.

II. Results.

We conducted a factor analysis with varimax rotation on the instructor rating items in order to reduce the number of dependent variables. The analysis resulted in three factors that accounted for 62% of the variance. The rating items and their factor loading scores are presented in Table 1. The first factor is dominated by items that are related to evaluation of teaching skills. The second is dominated by items that represent perceptions of how much the instructor can motivate or interest students. And the third factor includes items that represent perceptions of how much the instructor seems to like or support students. Three new measures were constructed for each of the factors by calculating the average of the items with the highest factor loading scores on that factor based on a loading of 0.50 or higher. Chronbach's alphas for each of the new scales are presented in Table 1. All alpha coefficients were above the generally accepted minimum. Based on significant correlations among the new variables ($p < 0.001$), we used MANOVA for subsequent analyses.

A 2 (handshake conditions) X 2 (gender of instructor) MANCOVA was conducted on the three instructor rating measures with touch as the covariate to evaluate the hypothesis that a handshake at the beginning of class would affect instructor ratings. Student gender was not analyzed due to a majority of female students in the sample. Complete data were available from 85 participants for this analysis. The main effect for handshake condition did not produce a significant difference, *Wilks's* $\lambda = 0.97$, $F(3, 84) = 0.83$, $p = 0.48$, $\eta^2 = 0.03$. However, the interaction between handshake and gender was significant, *Wilks's* $\lambda = 0.87$, $F(3, 84) = 3.99$, $p = 0.01$, $\eta^2 = .13$. Univariate ANOVAS revealed significant interactions for the "instructor skills," $F(1, 80) = 9.72$, $p = 0.003$, $\eta^2 = .11$, and "motivates students," $F(1, 80) = 4.06$, $p = 0.05$, $\eta^2 = 0.05$, measures. There was not a significant interaction for the "supports students" measure ($p > 0.05$). All group descriptive data are found in Table 2.

Table 1. Instructor rating items with factor loading scores.

Instructor Rating Item	Instructor's Skills	Motivates Students	Supports Students
The instructor seemed well-prepared for class	0.78	-.008	0.15
Rate your overall opinion of this instructor.	0.72	0.37	0.23
Rate your current opinion of the effectiveness of your instructor.	0.70	0.34	0.32
Rate your current opinion of the course as a whole.	0.64	0.22	0.15
The instructor shows genuine concern for the students	0.64	0.21	0.39
The instructor presented material clearly	0.63	0.28	0.12
The instructor seems like an excellent teacher.	0.58	0.52	0.17
The instructor is likely to evaluate my work in a fair manner	0.56	0.10	0.29
The instructor seemed enthusiastic about the subject matter	-0.11	0.78	0.16
I enjoyed today's lecture.	0.43	0.72	0.02
I would recommend this instructor to a friend.	0.41	0.69	0.26
The instructor is likely to motivate me to do my best work	0.48	0.61	0.18
The instructor seems to like students.	0.15	0.17	0.83
The instructor seems to want students to succeed.	0.32	0.03	0.82
I expect to learn a lot in this course.	0.20	0.20	0.62
Chronbach's α for items with bold loading scores	0.89	0.79	0.73

Highest factor loading scores are presented in bold.

Table 2. Descriptive data for handshake condition and instructor gender.

	Male		Female	
	No Handshake <i>n</i> = 13	Handshake <i>n</i> = 20	No Handshake <i>n</i> = 30	Handshake <i>n</i> = 22
Instructor's Skills	4.63 (0.13)	4.24 (0.10)	4.41 (0.08)	4.66 (0.10)
Motivates Students	4.65 (0.13)	4.36 (0.11)	4.66 (0.09)	4.80 (0.10)
Supports Students	4.82 (0.11)	4.81 (0.09)	4.68 (0.07)	4.80 (0.09)

Based on our hypotheses, one-tailed Fisher's protected t-tests ($p < 0.05$) were used to compare cell means for the two significant interactions. On "instructor skills," males were rated significantly lower in the handshake condition compared to the control condition. However, female instructors had significantly higher ratings by students whose hands were shaken than those in the control group. Within the handshake condition, females were rated higher on instructor skills than males. (See Figure 1.)

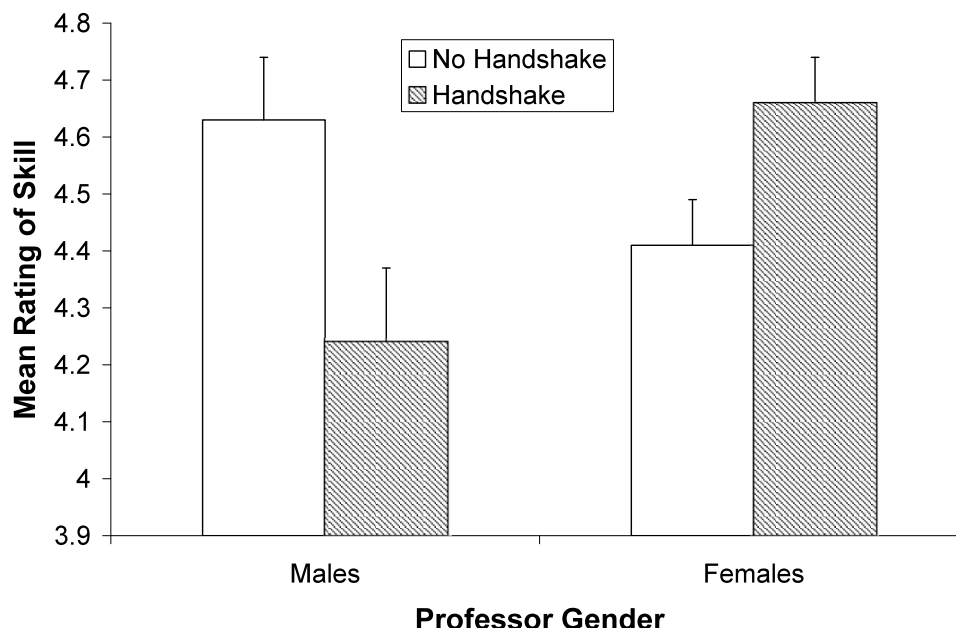


Figure 1. Handshakes caused lower student ratings of teacher skills for male professors and higher ratings for female professors. In addition, females who shook hands were rated as more skillful teachers than male professors who shook hands. Error bars represent *SEM*.

In a similar pattern, female instructors received significantly higher ratings than male instructors on the “motivates students” variable in the handshake condition. Further, male instructors were rated as less motivating by students with whom they shook hands than by those they did not. (See Figure 2.)

III. Discussion.

As expected, we found an interaction between handshake and professor gender, with touch improving the ratings of female professors but decreasing the ratings of male professors. Although these results would be expected based on the few available studies on touch (Rester and Edwards, 2007; Sanderson and Jorgensen, 1997), our results extended research to include a simple handshake. We should note that students did not differ on their ratings of instructor support; larger cell means might allow a more accurate assessment of potential differences across the female instructor, with a handshake causing higher ratings than no handshake.

One long-standing theory regarding gender differences in touch (Henley, 1973) suggests that touch is an expression of control and dominance. According to this theory, males initiate touch with females to establish and maintain their domination. In addition, shaking hands has historically been considered a predominantly a male activity (Chaplin, Phillips, Brown, Clanton, and Stein, 2000; Steir and Hall, 1984). Hand shaking is more likely to be initiated by males, and male-male handshaking is more frequent than female-female handshaking (Steir and Hall, 1984). Handshaking has been shown to influence a person’s initial impressions of the greeter, and these impressions extend to inferences about the greeter’s personality (Chaplin et al., 2000). The current study demonstrates that handshaking influenced the student’s impressions of the

professor's skills and motivation, and that the impression was negative for the male professors. Because the sample was predominantly female, the handshake may have been interpreted as a controlling behavior when given by the male professor. When given by the female professor, however, the same behavior would be seen as less controlling because it was a same-gender interaction.

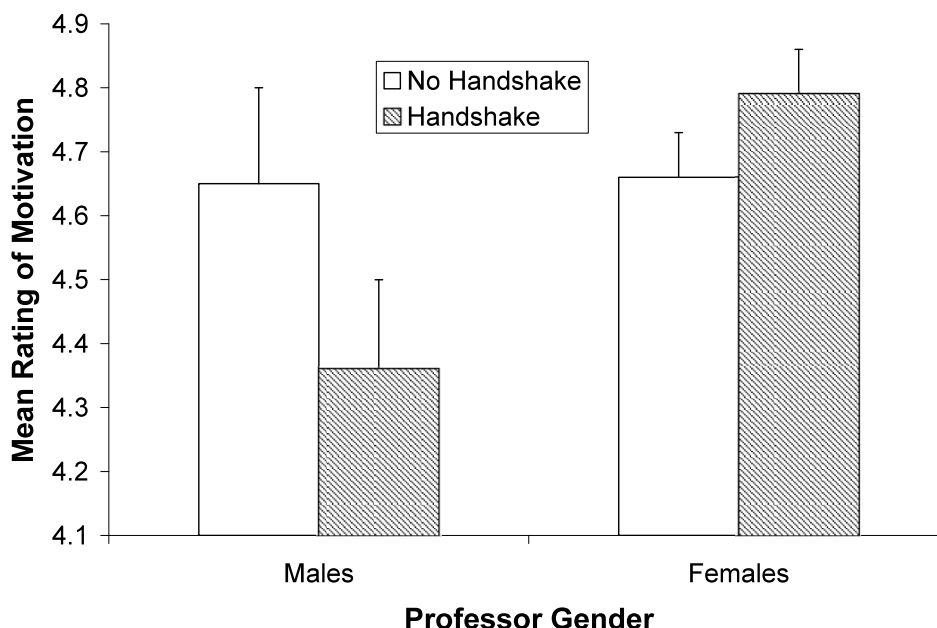


Figure 2. Handshakes caused lower student ratings of male teachers' perceived ability to motivate students than handshakes by a female professor or a male teacher who did not shake hands. Error bars represent *SEM*.

Guéguen (2004) suggested that touch could be used in the classroom as an indication of immediacy and that it had positive outcomes, even with a male instructor. It is important to note, however, that the study was conducted in France, which is considered a high-contact culture. On the other hand, the United States, in contrast, is considered a non-contact culture (DiBiase and Gunnoe, 2004), and so touch by a male professor in the current study may not be as welcome, especially by females. Of all the nonverbal immediacy behaviors, touch is the most likely to be labeled as sexual harassment (Mongeau and Blalock, 1994). Thus, it may not be surprising that a handshake by a male professor on the first day of class caused a negative reaction from a predominantly female student sample. It is intriguing that female professors generated positive impressions from the handshake, although perhaps not surprising. While reviewing the literature on touch and gender, DiBiase and Gunnoe (2004) noted that work subsequent to Henley's original theory showed that females initiate touch as much as, if not more than, males and that in the U.S. only hand touching is interpreted as an expression of dominance. If true, then students are less likely to interpret a female professor's touch as unusual. Further, because the handshaking is occurring predominantly between the same genders, the handshake may not be interpreted in the same manner as the opposite-gender handshake.

Touch may be a useful nonverbal immediacy behavior to positively impact the classroom (Guéguen 2004; Steward and Lupfer, 1987). The current study suggests that positive outcomes occur if a female professor is initiating the touch. Caution is suggested, however, with regard to male professors using touch as a nonverbal immediacy behavior, at least initially. For male professors, familiarity and rapport may need to be established before touch can be used to increase immediacy.

Some limitations of the current study include the use of slightly different welcoming phrases, although instructors were careful not to change the phrase based on whether or not students were touched. Another potential factor that may have influenced results was that students who did not receive a handshake may have seen other students receive a handshake. However, when students were debriefed, they were asked if they had noticed anything unusual about the instructor greeting some students with a handshake, and students indicated that they had not taken notice of the type of greeting. Future research might also assess both male and female students, as it is likely that student gender would moderate effects. Although male-male touch has been rated as the least acceptable combination (Sanderson and Jorgensen, 1997), male-male handshake is quite common and could offer an acceptable method of touch. Based on the high rate of male-male handshakes (Steir and Hall, 1984), we expect that male-male handshaking would be rated as more acceptable than a male professor shaking hands with a female student.

In addition to the potential moderators offered above, future studies should also address the potential long-term effects of a handshake on student motivation and attitudes toward the professor and course. Other research has demonstrated long-lasting impact of the first day of class (Wilson and Wilson, 2007). The question is whether the handshake has any continuing effect on the students. Unfortunately, the design of the current study does not provide the opportunity to answer this question. Another question is whether there are any circumstances that would provide an opportunity for male professors to appropriately use touch to increase immediacy in a non-contact culture such as the U.S., or whether touch as a nonverbal immediacy behavior is restricted to female professors based on the constraints of the culture.

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My life in a bag and other stories: On the road to resiliency

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Abstract: Post-secondary education students will experience transitions, successes, challenges, and adversities during their college years. Although they will continue their growth and development in many aspects of their lives during this time, perhaps a most critical, but often ignored, attribute for them to develop is resiliency, the ability to bounce back from difficulties. This article examines the findings from a phenomenological study of eleven students who participated in resiliency development education (RDE) as first semester post secondary students. The data confirmed that, when taught through the pedagogy of storytelling, students are able to use stories of their experiences and those of others to shape not only their perceptions and choices, but also behaviors and characteristics reflected in resilient individuals.

Keywords: storytelling, metaphor, pedagogy, resiliency, protective factors

“With weeping and with laughter,
Still is the story told,
How well Horatius kept the bridge
In the brave days of old.

Lord Macaulay, *Lays of Ancient Rome*, Horatius LXX

The heart of the human experience is often captured in story. The way in which students use the stories of their life experiences to understand themselves and their personal ways of addressing with difficult issues can often affect how they respond to challenges and adversity.

Each fall college campuses experience the influx of students ready to embrace college life. However, many of these students are leaving their parental homes for the first time, often unequipped mentally and emotionally to independently address difficulties of student life, expectations of academic rigor, and the insecurities of being away from their parents, thus, negatively influencing their academic success. Students who display resilient behaviors possess the ability to “bounce back” from challenges or adversity and are able to cope with the stressors inevitable to college students (Benard 1993, p. 44). Therefore, exposing post-secondary students to resiliency development education (RDE) may be an effective way in which to positively affect students’ experiences.

Research has provided sound evidence that resiliency can be taught (Werner & Smith, 1982; Benard, 1993, 2004; Masten, 2001; Wolin & Wolin, 1993). Characteristics that are

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significant of resiliency have often been labeled as “protective factors” (Benard, 1993). In her study, Benard (1993, 2004) identified four personal protective factors that could be found in varying degrees in people who seem resilient in the face of major life challenges. These protective factors are: social competence, problem solving skills, autonomy, and a sense of purpose.

The protective factors found in resilient people emerge in a variety of ways. For example, those with social competence often possess the qualities that exude responsiveness, flexibility, empathy, caring, communication skills, and a sense of humor. Socially competent people are able to develop relationships with family and friends in a variety of settings. People displaying skills in problem solving seem more able to think abstractly and reflectively while identifying possible solutions to problems – both cognitively and socially. Planning, creativity, and resourcefulness come easily to a problem-solver. Autonomous people have a strong sense of identity. They are independent in thought and action; they enjoy a sense of control over their environment, and are often able to separate themselves from dysfunctional family circumstances. Finally, those with a sense of purpose have goals, aspirations, hopefulness, perseverance, and a sense of a bright future.

Resiliency education involves exploring the interpersonal as well as the contextual. Teaching the concepts of resiliency requires a method or pedagogy that can span the affect in addition to the cognitive. A tool with the capacity to do both can be found in one of the oldest forms of communicating ideas and images, the art of telling stories (Mello, 2001). The teller becomes a “bridge builder, a person who broadens the discourse by describing images and messages” (p. 8) bringing meaning and understanding to the subject matter. Using storytelling as pedagogy enables students to examine their own self-story, find meaning in relating concepts to metaphors and folklore, and experience new understandings in mental images before applying them to life situations.

Supporting teaching strategies with stories enhances the process of educating students in the area of resiliency. According to Mello (2001), students begin examining their own biases and conceptions when presented with stories of diverse cultural texts (p. 8). Mello also posits that students create transactional experiences that allow growth in interpersonal and intrapersonal knowledge. Egan (1997) determined that students derived meaning by actively engaging in the content of stories using both their emotional intelligence and cognitive ability. As pedagogy in RDE, storytelling has the potential to enrich the acquisition of resilient behaviors and characteristics in students. The format and presentation, which make stories unique and innovative as strategies, are vital pedagogical tools for teaching and learning (Egan, 1997). The question for this study, then, was: How do first semester freshmen involved in RDE make meaning of resiliency in their lives through the pedagogy of storytelling?

I. Background of the Study.

It was during a meeting of the Academic Standards Committee, at a mid-sized midwestern research university, that discussion began focusing on concerns raised when reviewing written requests by students to be reinstated after a period of dismissal from the university for lack of satisfactory academic progress. As committee members discussed the requests, they began observing a repeated pattern among students who had been dismissed. More often than not, they found that students’ responses to adverse situations in their lives were devastation and an inability to grasp perspective. The issues seemed to raise barriers and would result in poor class

attendance, missed assignments, poor workmanship, and often dropping out of the class. Furthermore, the evidence suggested that the students had not developed any productive strategies to address life challenges. The insight into this perplexing trend prompted one of the committee members to suggest resiliency education for beginning post secondary students.

As stated earlier, research is adamant that resiliency can be taught (Werner and Smith, 1982; Benard, 1993, 2004; Masten, 2001; Wolin and Wolin, 1993). Therefore, a learning component about resiliency development for post-secondary students would contain opportunities to understand, internalize, and “try on” resiliency. The ultimate goal of RDE would be to allow students to internalize the nature of resilient behaviors and characteristics as well as increase the choices of response in the face of difficult life challenges.

Understanding the student experiences and perceptions after exposure to resiliency development education could lead to tactical undertakings in resiliency education at the college level that have the potential to greatly impact retention. Therefore, this RDE project explored how to encourage students to rise above those adverse situations and work through them in a healthy, productive manner. In essence, we were curious as to how we could help students to grow into resilient young adults through intentional instruction. The project then, would encompass a curriculum that would be actualized in a classroom setting.

Part of the curriculum was implemented in a freshman class through a leadership and learning academy at a Midwestern university. The academy offers two semester-long courses. The first course, which included the sessions on resiliency, is designed with an emphasis on: (a) learning about learning, (b) learning about self, (c) purposefully developing community, (d) deliberately practicing and refining skills to support and encourage the growth of self and others, (e) practicing metacognition, and (f) engaging in intentional mental processing. In addition to affording plenty of individual talk time, weekly two and one half-hour meetings provide opportunities for students to participate in frequent team learning. Consistent with the goal of helping students manage and control their own growth and development while supporting the learning of their colleagues, the team learning opportunities centered around the science of learning and the deliberate development of community.

Four sessions of RDE were taught to forty-seven first semester freshmen in the Academy for Leadership and Learning, facilitated by a lead professor and four supporting faculty. The curriculum was designed as a tool to engage students in the awareness and development of resiliency. Each session involved a variety of activities and learning components focused on internalizing an understanding of resiliency as well as an opportunity for a self-discovery of protective factors. There were continual checks for understanding and opportunities to reflect and share about the learning experience.

While conducting the sessions, the co-facilitators and participating faculty began to notice significant changes in many of the students. It was as if they were practicing new behaviors, deeply reflecting upon what they had learned about in the sessions on resiliency, connecting past and present situations, and applying their new understandings in their lives with new awareness. For example, some of the students began sharing moments they handled differently using various tools learned in class, such as reframing and self-talk. They became more confident in expressing the protective factors they had identified in themselves and how they could use them to address challenges or adversity. As the co-facilitators and faculty listened to and observed the students in class, it became evident that there were a number of students who really had made their own meaning of resiliency and were beginning to make important connections to their lives as college students. We believed it was important to find out from the

students what meaning they made of the phenomenon of becoming more resilient. An email was sent to 20 of these so identified students, describing the study and requesting their participation. Instead of selecting a pre-determined number of participants, the 11 students who responded with a desire to be a part of the study were chosen.

Making meaning of resiliency in their lives is ultimately up to the students. Our goal with this study was to identify reasons for changes in students' behaviors and to reveal important factors affecting the development of individual resiliency.

II. Methodology.

In light of the various factors affecting transition and adjustment of the freshman student to the college experience, it was prudent to explore how these young adults made meaning of resiliency, the ability to deal effectively with challenges, in their lives. This chapter describes the methodological framework used to conduct this phenomenological study. We begin with the theoretical framework.

A. Epistemology.

Exploring epistemology gives researchers an opportunity to probe the philosophical underpinnings that explain how we know what we know. According to Jones, Torres, and Arminio (2006), epistemology refers to the assumptions one makes about the process of gathering knowledge. Constructionism, which informs this study, is an epistemological lens which views knowledge and "all meaningful reality as such, as contingent on human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context" (Crotty, 2003, p. 42). Meaning is constructed in relationship to something; it is not discovered, but constructed (Crotty, 2003).

B. Theoretical Perspective.

The theoretical perspective that supports the methodology for this study can be found in the interpretivist philosophy. The ontology of the constructionist-interpretivist is that there are multiple valid and socially constructed realities (Ponterotto & Grieger, 2007). Therefore, the multiple realities of the lived experience can be interpreted for meaning through the lens of perception. We can only construct meaning to what we perceive in the present, our current reality, with the knowledge we have embodied and gathered in the past.

The curriculum for the resiliency development component was designed with the intent to introduce the protective factors of resiliency to the students. Through the teaching process, the intent was to help students identify and enhance their existing protective factors as well as learn how to bring new strengths into being. For this to become a reality, it was necessary for the students to take the new knowledge and combine it with what they knew of themselves as they began the process of constructing new meaning in terms of resiliency.

C. Methodology.

The methodological approach of phenomenology was appropriate for this study as we discerned the "essence" of the experience as described by the students (Creswell, 2003, p. 15). Phenomenology seeks to achieve a deeper understanding of the meaning of our theoretical

activities not only in describing the essences, but also through grasping concepts rooted in the ordinary lived experience. The phenomenologist, Merleau-Ponty, believed that the phenomenological philosophy is essentially the description of the “perception” of the perceived world (Matthews, 2002, p. 46). Merleau-Ponty reiterates in *Primacy of Perception* (1964), “The perceived world is the always presupposed foundation of all rationality, all value and all existence” (p. 13). Merleau-Ponty believed that describing the perception was primary for phenomenology. By looking at our ordinary engagement with the world from a bit of distance, we gain clearer insight and understanding, just as we might by holding a book a little way from our eyes in order to read better (Matthews, 2002, p. 35). As the students described their experience with RDE, the very act of putting their perceptions into language simulated the “stepping back” which elucidated, for them, the essence of the experience.

The heart of phenomenology, which informed this study, is the lived experience (Merriam, 2002). It brings into relationship the conscious subject and the object (Crotty, 2003), in this case it was the student and the notion of resiliency. As researchers, it is important that our focus is not on the humans nor on the human world, but rather on “the essence of the meaning of the interaction” (Merriam, 2002, p. 93). Merleau-Ponty, conceived phenomenological philosophy as “re-learning to look at the world” (Matthews, 2002, p. 46). The goal of this study was to understand the phenomenon of the students’ experiences of “re-learning to look at the world” after the encounter with RDE. Phenomenology was appropriate for this study as we discerned the “essence” of the experiences as described by the students (Creswell, 2003, p. 15).

D. Methods.

Epoche process. The phenomenological approach to the process known as epoche is that of bracketing, or setting aside, preconceived notions, ideas, or theories concerning the present study in order to eliminate as much bias as possible (Moustakas, 1995). This enables the researcher to come to the data with an open mind.

At the onset of the study, it was necessary to highlight the biases that were evident in our previous experiences studying resiliency. It was, therefore, essential that we bracket our viewpoints in order to prevent the assimilation of our thoughts into that of the participants. The isolation of our previous beliefs, assumptions, and biases was pertinent to the study:

- It is possible for one to learn to be resilient.
- There are certain characteristics that can be found in resilient people such as intrapersonal skills, optimism, social competence, the skill of problem solving, and the ability to set goals and look forward to something in the future.
- People who are not resilient are not always suicidal or otherwise maladjusted.
- Resiliency is essential for fulfillment in life.
- Resiliency is seen in response to a plethora of challenges – large and small.
- Resiliency is an attitude that is reflected in behaviors, feelings, and beliefs.
- Resiliency brings responsibility to the forefront: that of choice, action, and thought.
- We can affect another’s resiliency by providing a caring environment, and having healthy expectations and opportunities to be a part of and contribute to an organization or relationship.
- Knowing one’s strengths contributes to one’s resiliency.

Throughout the process of data collection, we reviewed this list in order to maintain our focus on the lived experiences of the students.

Participants. Four sessions of resiliency education were taught in a leadership and learning academy in the Midwestern university. The class was comprised of 47 freshmen students from a variety of majors: animal ecology, business, diet and exercise, elementary education, exercise science, horticulture, physical therapy, and veterinary science. Qualitative research, steeped in a search for meaning necessitates selecting participants who can bring rich and meaningful data to the table. Since the “idea behind qualitative research is to purposefully select participants...that will best help the researcher understand the problem and the research question” (Creswell, 2003, p. 185), the participants for this study were purposefully selected. The participants selected were those students who engaged in the observed phenomenon of making meaning of resiliency in their lives after participating in RDE. Eleven of the 20 identified students agreed to be a part of this study.

Of the 11 participants in the study there were nine females and two males; all were freshmen students between 18 and 19 years of age. Four of the participants were first generation college students and all were Caucasian, 10 heralding from the state of Iowa and one from Wisconsin. There were a variety of academic undergraduate majors: three in animal ecology; two in horticulture; two in elementary education; one in exercise science and physical therapy; one in diet and exercise; one in business; and one in the pre-veterinary program.

Data collection. In order to gather rich and meaningful data, important to a phenomenological study, one of the principal methods used by researchers is the interview (Merriam, 2002), the “heart of social research” according to Esterberg (2002, p. 83). To realize the most effective interviews, the data were collected from focus groups and individual interviews that were in-depth, semi-structured, and guided with non-scripted, open-ended questions evoking authentic insight and perspective from the participants (Esterberg, 2002). Data collection began with two focus group interviews; one group consisted of seven participants and the other had four. Two different sessions were held to accommodate the schedules of the participants. Each 45-minute session was audio taped and transcribed verbatim. Face-to-face and telephone individual interviews were then conducted with each of the 11 participants. In addition, data were collected from the students’ journals, other assignments, and end-of-semester written summaries of their learning.

Data analysis and interpretation. At the start of the analysis, using the steps described by Colaizzi (1978), all transcripts and journal entries were carefully read in order to understand the essence of the students’ written and oral reflections as well as to be mindful of reoccurring topics. After a coding procedure was developed, the transcripts and journal entries were read and reread using a color-coded system to highlight significant statements, and to sort and identify potential meanings of the data. Themes were then constructed and integrated to produce an exhaustive description (Colaizzi, 1978) of the students’ experiences identifying and articulating the phenomenon’s fundamental structure. Finally, the data were checked for validity by returning them to the participants for confirmation of thematic interpretation.

III. Findings.

The themes ubiquitous within this study were: (1) the efficacy of learning resiliency through the pedagogy of storytelling; (2) the value of learning in community; (3) and the transformative resiliency development of the post-secondary student. The fundamental structure

of becoming more resilient, then, as perceived by the participants, was a self-recognized transformative development resulting from making personal meaning through stories and experiences within a community of learners, and then intentionally applying the learning to one's own life. This complex statement is potent with possible options to explore for students and educators alike. However, this article addresses the meaning post-secondary students derived from the exposure to storytelling as pedagogy in resiliency development education.

A. Storytelling as pedagogy.

Innovation in teaching methods is welcomed by many institutions in a day when students are increasingly conversant with highly creative methods of dispersing information via internet access (Braxton, 2004; Gerdes and Mallinckrodt, 1994). During this study, storytelling, a technique that is as old as the world itself, was used as an innovative method of enhancing student learning.

Storytelling is one of the most basic ways of sharing what we know, making sense of our experiences, and gaining insight into ourselves and our relationships with others in our world (Adams, Allendoerfer, Smith, Socha, Williams, and Yasuhara, 2005, 2007; Mello, 2001; McAdams, 1993; Connelly and Clandinin, 1988). The RDE curriculum incorporated storytelling as part of the pedagogy in a variety of ways throughout the sessions. In order for the students to gain a deeper understanding of themselves in relationship to resiliency, it was necessary for them to explore their own stories. The activities that enhanced this understanding included:

1. "Know Thyself" – students made a conglomerate of words describing their attributes of character and strengths.
2. "Life in a Bag" – students put five things in a bag that represented something important to them or about them.
3. "Self-story" – using the "Know Thyself," "Life in a Bag," and a story-starter (a list of memory joggers), students were to write a self-story describing five major experiences in their lives which affected who they had become.
4. Insight Learning Personality Instrument™ - to identify their personality spectrum.
5. "My Four Protective Factor Analysis" – activity to allow opportunity to identify and analyze the presence of their personal protective factors.
6. "Reframing and Self-talk Practice Schedule" – allowed the students to monitor how they reframed situations for a better solution or used self-talk to adjust their attitude toward an issue or challenge.

Stories based on folklore, personal illustrations, and reference to the self-story, were used throughout these sessions to enhance the curriculum by making connections and analogies to correspond with the concepts being taught. This study examined the experiences the students had with the curriculum for development of resiliency within the pedagogical framework of storytelling.

As pedagogy, using a story invites inquiry. It is fairly easy to use story within teaching lessons, information, or mental processing (Collins and Cooper, 1997). According to Clandinin and Connelly (1994), the story often stimulates questions allowing for increased clarity and insight. Stories are a vehicle to transfer meaning and understanding in a safe and unthreatening environment. Research conducted by Livo and Rietz (1986) indicated that material presented through the means of story rather than lecture held the interest of the students and made a far greater impact. By using stories in this study, we were able to present an abstract concept, such

as resiliency, in a concrete form. Sharing stories at strategic points in the curriculum enabled us to enhance and deepen the understanding of resiliency. The data attested to the importance of using stories to augment comprehension of what resiliency is and how it can be applied and lived out in our everyday lives. This finding was initially revealed as the students experienced meaning through the writing of their *self-stories*.

B. The Self-story.

Using narrative to support pedagogy is a main claim in educational research for the simple reason that, “humans are storytelling organisms who, individually and socially, lead storied lives” (Connelly and Clandinin, 1990, p. 2). The introductory sessions for this study focused on building an awareness of self. In order to facilitate the exploration of who they are, we first wanted students to understand the stories of their lives that brought them to this point. Given paper bags, each student was to return to class with “My Life in a Bag.” The students were given the opportunity to think about their past experiences and then to represent them using five objects or representations which they put in a paper bag (Livo and Rietz, 1987; Pellowski, 1987). The stories around those artifacts were to tell something about themselves. The meaning that the students discovered through this experience highlighted the sessions and often propelled them to see who they were in a new light.

The self-story informs as well as forms our lives (Widdershoven, 1993). In this study, the self-story seemed to evoke a deeper understanding for students of not only who they are today, but also who they had been before as they reflected on the persons of their younger years. Andrea found the “My Life in a Bag” activity to be a defining moment. She described its impact:

[The activity “My Life in a Bag”] is so cool because it gives people the chance to really look in the mirror and see what is important to them and to some extent can help people reprioritize.

Allison enthusiastically relayed her experience:

My favorite assignment was “My Life in a Bag.” I realized that there are tons of things I really enjoy, but they don’t necessarily describe me or say who I am. This assignment really made me think hard about who I am and what makes me who I am.

When teaching concepts that encourage reflection, past experiences, positive and negative often resurface. For many in the class, revisiting unpleasant memories was not always easy, but often worthwhile as Mary revealed in her journal:

Most of my stories that I wrote and didn’t write had the feeling of anger and sadness tied to them. I was put in the middle of a lot of my parents’ fights and was let down a lot. I know what it feels like and know that I will not put my own children through the same thing. Situations that have gone on between my parents will always stay with me. I will never ever forget them. They have changed who I am today.

A sense of appreciation for the learning or growth often replaced the resentment and tamed the anger for having to endure emotional pain. Mary continued to put a positive frame around her past:

In a way, I'm kind of glad they occurred because I feel they made me more mature and able to handle a lot more for my age. A person who is resilient has buoyancy and adaptation in their lifestyle. I feel that I have some of these characteristics in my life. Resiliency has truly taken on a new meaning for me.

Moving away from a painful experience involves making a reactionary choice. Resiliency is often exhibited in persons who know how their emotions affect their thinking and their reactions to events in their lives (Wolin and Wolin, 1993). Laura discovered that understanding the concepts of resiliency could shape her thinking in several ways:

It was a rough semester for me, so learning about it [RDE] really helped me get through everything. There was a lot, a lot of emotional that I was dealing with, and stuff, and I mean, I'm still dealing with it, but it's [knowledge of resiliency] helped in everything.

Post-secondary students interact more independently with personal and academic issues than when they were in high school and living in their parental homes. Using stories as a teaching strategy, the ability to understand the manner in which the brain links emotion and memory gives insight and appreciation for memories that are difficult or painful in our lives (Goleman, 1995). Resiliency occurs when one is able to view those experiences as fertile ground for personal growth. In her journal, Andrea described how she had come to understand her strength or resiliency by looking at the hardships faced in her past:

In almost every case I can trace my "strength" or "resiliency" to my past experiences. It's unfortunate, but true, that the majority of my past experiences that have helped to develop my resiliency were bad or sad experiences. As much as my experiences stunk, it's cool to look back on them and see that they've helped me grow into a better person...they've repeatedly taught me and shown me that life continues even during hard times, and after these hard times, it's so important to gather yourself and essentially bounce back despite the hardship.

C. Illustrating through folklore.

Throughout the remaining sessions, storytelling was used as a way to define, identify characteristics, explain the components, and introduce tools of resiliency. A menu of stories, used to illustrate the concepts of resiliency, was presented in the form of metaphors, folklore, or personal experiences. Using the oral tradition, without using visual aids, but only the listener's imagination, the participant could visualize an actual mental scene in which behaviors could be rehearsed or "tried on."

Teaching reframing and self-talk, two essential tools of resilient reactions to challenges, can effectively be tendered through stories. One story particularly meaningful to the students and an example of the power of reframing and self-talk was *The Spyglass* written by Richard Paul Evans (Evans, 2000). The repeating phrase found in the story, 'You have seen what might be, now go and make it so,' seemed to resonate with the students long after the story ended, as Adam wrote:

Today I was thinking about the "Spyglass" story that was told a couple of weeks ago. It was a really inspirational story. If you look at something from a different perspective, it becomes 10 times better than it was. The quote that was repeated, "You

have seen what may be, now go and make it so” made me rethink different things in my life. That story meant a lot to me in how it influenced me personally because it has happened to me. I will do my best to go and make it so.

Thinking deepens the awareness and begins the process of change. Carla found this to be true:

I think the stories were crucial because it got me thinking. When I’m listening to a story I put myself in that story and it causes me to care, and it gives you a picture to associate with things. What comes to mind...for me is the bridge story, and how the two brothers were not willing to make amends. Like my best friend and me...there are times where I need to be a better brother than in that story...[that] is the very clear message in those stories.

As the students made meaning of resiliency through the stories shared in class, it causes one to wonder what impact storytelling could have in other disciplines such as math and science. Even in hard science disciplines, such as engineering, when pedagogy of storytelling is utilized to disseminate information, feelings and attitudes can be affected to promote thinking and innovation by “shift(ing) people’s stories” (Adams et al, 2005, 2007, p. 10). Allison recalls a story and the impact it had on her:

The stories were huge! They helped connect to real life situations. You know the Toll Booth one? [It taught the message], you know you just can’t let stuff like that get you down. You gotta keep moving forward. You gotta do what you want. I mean the stories had a real life connection versus, “Ok, read your textbook, this is what it says.” It doesn’t make a connection, where all the stories, well, they could be real people, and they connect with other people, so... I can read my chemistry book 30 times, and I’m not gonna connect to it, but the stories are what makes the connection for me.

The retention of information is a constant motivation to adjust and sharpen teaching strategies. Since the nature of stories affect emotion, they garner potential to greatly affect retention of material taught in any academic discipline. Students make ‘hooks,’ so to speak, because they put themselves in the content. Reflecting upon the nature of the brain to retain emotional memories, when a burst of insight is gained after seeing a connection, the chances of remembering it for a long time increase dramatically (Sprenger, 1999) which Andrea attested to in her journal:

The stories are just something that always sticks in your mind, kind of like an “aha” thing...like a role model almost, even though it’s fictional. It’s just like something that...affects people for a day, maybe for a week, maybe it affects people forever, but I think a story is something people can really hang on to.

Stories need to be chosen carefully, with intentional purpose when incorporating them into a curriculum. It was not happenstance that particular stories were used to teach resiliency. They were each chosen with purposeful intent, pertinent to the subject matter. Students are keenly aware when course content is filler and when it is dynamically intentional according to Mary:

...it made us visualize the story and connect it to what we were learning. It wasn’t like, just thrown in there, ‘here’s a good story,’ or ‘story time,’ but I mean, it made me connect the things. I remember the story about the dog...and then the builder

of the bridge and it was when we were remembering, or trying to learn the autonomy and sense of purpose, problem solving, stuff like that, but it really made things connect, and I enjoyed the story a lot more because then I connect them, and I'd actually think about the words...and be like, 'Oh, this is the definitions of this.'

Using stories as an instructional tool allows the students to not only check for their understanding, but also to measure their growth. By mere repetition from an instructor or through the mental rehearsal of the listener, the story can act as a gauge to show the students' progress from one point in life to another. Adam brought this meaning to light during the individual interview:

There was one story that stuck out in particular. It was the one about the king and he had you look through the glass and then said, "You've seen what can be, so go and make it so..." Being able to see, like, how much better I've become from this semester, being able to see how much better I could be, like I've seen how much I've grown this far, like how much further can I grow? I remember like, they were looking at some old garden that didn't have anything and they looked through it and they could see green vegetables and tomatoes, and all that stuff, when I hit that it was like, it's just like me, looking at myself in the mirror, it's sort of the same thing. If I could be a lot better than this, I look at it and it's like, oh yeah, I could be a lot better, and so then I'd go and do it.

D. Illustrating through metaphors.

Metaphors are figurative descriptions of a concept. When one is able to express a concept in the rhetoric of a metaphor, then true understanding has transpired. Metaphors encourage one to think outside the proverbial box (Adams et al, 2005, 2007). During the focus group, Adam explained how it [the concept of resiliency] suddenly made sense to him:

I had an "aha" moment when we first started talking about resiliency. I didn't really, understand the meaning of resiliency, until the day when we brought out the rubber bands. It's like, you can be stretched to your limit and be stretched there for a really long time, but you'll come back to normal, like just the small little circle of your rubber band. But if you keep being stretched and come back, you keep stretching it out and there's a possibility that it will break the next time that you pull it back out again, so you don't wanna be pulled out to the max every time, about halfway maybe, and then back down.

Resiliency has often been defined as the ability to "bounce back," successfully adapt to the effects of adversity, and develop a social competence even in the face of severe stress resulting from personal or environmental challenges or trauma (Benard, 1991). Karen summarized the basics of seeing resiliency at work in her life with this analogy:

I learned what resiliency was. That was huge, just learning that it was an option for your life, to be like, 'you don't have to carry all that, you can learn to bounce back from stuff.'

Storytelling as a pedagogical strategy promotes critical thinking and reflection (Adams et al, 2005, 2007). In this way, self-stories, folklore and metaphors paved the way to introduce the concept of personal protective factors, reframing and self-talk, all tools pivotal to resiliency.

Metaphorical thinking enabled the students to relate how strengths and protective factors impact their actions and ways of dealing with their life issues. The mind's eye or in other words, the imagination allowed the students to envision (reframe) an alternative way of looking at a challenge or adverse situation by creating a new "story" to live by. In the same manner, using self-talk simply involved generating a dialogue that encouraged a new behavior or way of facing an issue. Mary was affirmed that there could be some good found in her unhappy past by incorporating the skill of reframing to see past wrongs as ground for future growth:

I guess, just looking at the situation and knowing again, that it could be a lot worse, cause in my life, like, I had a terrible childhood, so then that makes me look at my future and how I want to shape my future and what kind of job I wanna have, so I know my kids don't have to go through the stress that I had to go through, cause of my parents and because of their mess-ups.

The strategies found in teaching reframing as a tool of resilient reaction showed Donna how to stop and review the situation, then adjust her course of action.

Reframing has taught me the importance of stopping and examining a situation. This exercise of reframing situations is making me apply this method of thinking. I tend to be negative or look at the negative in situations. Reframing has been teaching me to slow down and think things through along with re-examining a situation. Reframing this situation doesn't make the problem go away but it helps me to think clearly and remain calm during this situation.

Metaphorically speaking, perhaps the students in essence learned to "re-story" their lives in order to successfully navigate the challenges faced in their everyday.

Using story as a pedagogical tool to present the various concepts embedded in RDE, the students made meaning by allowing the stories (be it their self-stories or illustrative stories) to make deep and lasting connections to the information. They used the stories as a place to practice what they learned about resiliency and then apply it to their everyday lives. Using stories to connect abstract concepts to students' lives allowed the curriculum to become more meaningful to the students, and, thus, they were able to perceive resiliency in their lives by connecting the past, present, and future experiences. Merleau-Ponty (1948, trans. 2004), the French phenomenologist, claimed that our perceptual experience should be deducted with a reasoning or knowledge structure:

It is our 'bodily' intentionality which brings the possibility of meaning into our experience by ensuring that its content, the things presented in experience, are surrounded with references to the past and future, to other places and other things, to human possibilities and situations (p. 10).

IV. Discussion.

In reflecting upon the reaction of the students to their personal growth and enhanced understanding of self through RDE it is without question that using story as a teaching strategy was paramount to their ability to learn the concepts of resiliency. Students' enthusiastic identification with the messages of the stories attested to its importance and value of this pedagogy. They supported the research that stories are vehicles that bring us to a better understanding of our lives (Kilpatrick, 1993).

What would happen if major concepts from all disciplines could be paired with stories or metaphors that could illuminate meaning and understanding for students in the classroom? What would happen if educators focused on 're-storying' lectures to include illustrations borrowed from folklore or personal encounters? How much more information could effectively be retained by students if we adjust our teaching strategies to include the art of storytelling? Stories encapsulate clues by which educators, listening to the stories of the students, can use to know what is real and important to them and thus know what questions to ask that will enhance their learning (Collins & Cooper, 1997).

Karen gave voice to the importance of the story as a tool of instruction:

The stories told really made an impact on how we learned the protective factors. It made the lesson more engaging and interesting. It made me realize that everything, story or situation, has a way of turning out for the best. I just have to look for it. By looking for the key factor in situations, I'll be able to find the underlying meaning in almost everything. I hope to continue using the tools I have learned while in this class. I hope to continue to be resilient.

The story is invaluable as a tool be it used as a metaphor, which connects abstract concepts to concrete understanding, folklore that allows one to immerse in mental practice, or the self-story which encourages exploration and analysis of one's identity. This evidence suggests that educators should seek ways to incorporate stories as a method to enhance student learning. Andrea framed it well from the perspective of a learner:

I can almost 100% guarantee myself that five, ten years from now I won't remember many details or concepts from my classes such as biology or chemistry, but there is no doubt in my mind that I will regularly use the concepts and ideas discussed throughout this course.

The implications of this notion suggest that when applied in the field across a variety of disciplines, retention of information increases. What then would happen if instructors in the fields of math, science, or English, for example, offered a story, as a teaching tool, illustrating the desired concept to be taught? According the data from this study, students would construct meaning with the concept by way of putting themselves into the content of the story, thus creating a hook to which they can then connect knowledge with understanding.

Directed to the concept of resiliency, it would appear there is a way to prevent students from being devastated by crisis, challenges, or setbacks as was often observed by Academic Standards Committee members who initiated the original project. The potential exists within RDE that through the thoughtful use of stories, students may learn to address the adversity they experience with resilient behaviors and attitudes. The students in this study were able to make personal meaning and apply it to their lives through their understanding of the protective factors, as well as their abilities to use the tools of reframing and self-talk to confront and address the issues they faced. Critical to this understanding was the story, whether it was metaphor, folklore, or self-story, that provided the insight and virtual practice to face future obstacles.

V. Conclusion.

The stories of experience hold power in the process of shaping not only our perception, but also our character and values. With a keen understanding of that power, White (1982)

related, “what is imprinted deeply on our minds in our youth shapes who we are and what we shall become. The stories, the dreams we live by, are vital for our growth” (p. 22). If the use of story encompasses such a magnitude of possibilities to affect the connections students make with resiliency development, why would we, as educators, not enthusiastically embrace this pedagogical concept with which to help our students learn more deeply?

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Mission

Founded in 2001, the Journal of the Scholarship of Teaching and Learning (JoSoTL) is a forum for the dissemination of the Scholarship of Teaching and Learning in higher education for the community of teacher-scholars. Our peer reviewed Journal promotes SoTL investigations that are theory-based and supported by evidence. JoSoTL's objective is to publish articles that promote effective practices in teaching and learning and add to the knowledge base.

The themes of the Journal reflect the breadth of interest in the pedagogy forum. The themes of articles include:

1. Data-driven studies: formal research projects with appropriate statistical analysis, formal hypotheses and their testing, etc. These studies are either with a quantitative or qualitative emphasis and authors should indicate the appropriate domain. Acceptable articles establish a research rigor that leads to significant new understanding in pedagogy.
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Style Sheet for the *Journal of the Scholarship of Teaching and Learning*

John Dewey¹ and Marie Curie²

Abstract: This paper provides the style sheet for the Journal of the Scholarship of Teaching and Learning. Manuscripts submitted for publication should adhere to these guidelines.

Keywords: radiation, metacognition, identity theory, constructivism, educational philosophy.

I. General Guidelines for the Manuscript.

The final manuscript should be prepared in 12-point, Times New Roman, and single-spaced. Submissions should be double-spaced. All margins should be 1 inch. The text should be fully left- and right-justified. The title (in 16 point bold) and author's name (in 12 pt. bold) should be at the top of the first page. The author's name should be followed by a footnote reference that provides the author's institutional affiliation and address. The abstract should be indented 0.5" left and right from the margins, and should be in italics.

Except the first paragraph in a section subsequent paragraphs should have a 0.5" first line indent. Use only one space after the period of a sentence (word processors automatically adjust for the additional character spacing between sentences). The keywords should be formatted identically to the abstract with one line space between the abstract and the keywords. Keywords currently in use are indexed at the end of each volume. Authors should use keywords that are helpful in the description of their articles. Common words found in the journal name or their title article are not helpful.

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II. Section and Sub-Section Headings.

A. Major Sections.

Major section headings should be flush-left, bold-faced, and roman-numeral numbered. Major section headings should have one-line space before and after. The first paragraph(s) of the article do not require a major heading.

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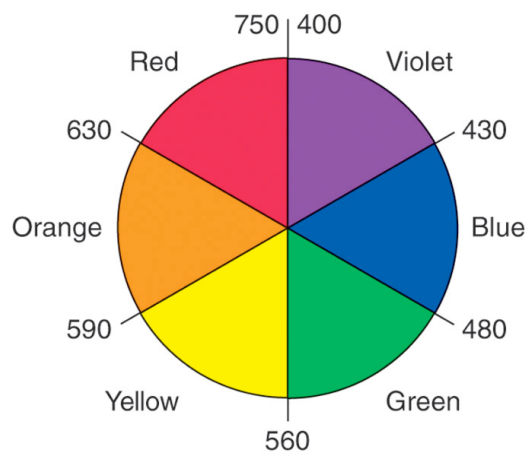


Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

Acknowledgements

Acknowledgements should identify grants or other financial support for this research by agency (source) and number (if appropriate). You may also acknowledge colleagues that have played a significant role in this research.

Appendix

Please insert any appendices after the acknowledgments. They should be labeled as follows:

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References

- Coffin, D.A. (1993). Using the competitive edge. *Journal of Economic Education*, 24 (1), 62-69.
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