International Journal for the Scholarship of Technology Enhanced Learning *Volume 1 Issue 1 2016*
Pages 24-42

The Effect of Project-Based Learning on Student Performance: An Action Research Study

Darren H Iwamoto, *Chaminade University of Honolulu, diwamoto@chaminade.edu*
Jace Hargis, *Chaminade University of Honolulu, jace.hargis@chaminade.edu*
Ky Vuong, *Chaminade University of Honolulu, ky.vuong@chaminade.edu*

Abstract
This study analyzed the effectiveness of an alternate pedagogical approach in the form of standards-focused project-based learning (PBL) teaching model in psychology classes. Both the control and experimental groups initially adopted a negative attitude when presented with an alternate method of learning. They viewed the group project as an unnecessary task although the literature contradicts their initial perception. Data analyzed found that the experimental group that engaged the project and took responsibility for the learning of their peers scored significantly higher on the multiple-choice exam when compared to the control group. No significance was found in the second experimental group where majority of the students did their part, but did not report feeling a sense of responsibility for the learning of their peers. Key indicators for higher academic performance were: 1) high self-efficacy; 2) high level of perceived control; and 3) growth mindset.

Keywords: Project-Based Learning, Active Learning, curriculum development

Introduction
There has to be another way to reach my psychology students. That thought increased as each semester came and went. My challenge was that I was using a teaching model that I grew up with. By doing so, I began to notice an increasing amount of students that lost interest after about 8 minutes into the lecture. When I tried to engage my class with discussion questions I received blank stares, heads darting in all directions other than at me, and when I called upon students the responses I received was evidence that pre-class reading did not occur. Granted, there were exceptions, but it was not enough for me to feel confident that what I was doing was effective. The tipping point came when I noticed that many of the quizzes and examinations that I was giving had more F's than A's. This is when I knew something had to change. My thought went back to the question, how can I meet the learning needs of today's 21st century college student?

Simpson, Stahl, and Francis (2004) discovered that many students believed that learning in school should be easy, able to be completed quickly, and provided to them. Furthermore, "first-year college students have formed their personal theories about learning by the time they graduate from high school" (Simpson et al, 2004, p. 4). This supports the idea that students entering an institute of higher education can at times arrive with learning habits that have been conditioned, reinforced, and influenced by other possible experiential variables from when they first began formal education.
In many ways, 21st century students are comfortable learning on their own and satisfying their intellectual curiosity with tools like Google, Bing, and YouTube (Brown, 2006). They typically seek

quick and succinct answers to address their immediate challenge. This new way of learning counters the traditional factory model of education where students are herded into large buildings and provided large stocks of knowledge for later use (Newell, 2003; Brown, 2006).

How 21st century students learn and perform academically is directly related to their personal belief system. Their personal belief system serves as their filter in how they interpret their academic responsibilities in and out of the classroom (Thomas & Rohwer, 1986; Nist & Simpson, 2000; Simpson & Nist, 2002). In addition, "a student's belief can influence other factors of learning such as motivation, strategy development, and academic performance" (Simpson et al., 2004, p. 4). Further review found a positive relationship between students' perception of control in the classroom and academic achievement (Stupnisky et al, 2007).

Social cognitive theory states that people (e.g., students) must believe in their capability to learn before change in their thinking and behavior can occur (Bandura, 1986, 1997). Phan (2010) presented evidence supporting this by discovering that self-efficacy, when compared to self-esteem, is a more accurate determinant of student performance. In addition, Simpson et al. (2004, p. 4) found that "successful students believed that they were totally or partially responsible for their learning while less successful students viewed the professor as the person who not only controlled what they would learn, but also whether they would learn."

Nielson, Du, and Kolmos (2010) theorized that learning is not only about knowledge acquisition, but also about creating new knowledge collaboratively when addressing complex problems; this requires interdisciplinary knowledge and innovative thinking. Students must now be prepared cognitively and emotionally to solve collaboratively the complex challenges that arise in their professional life. Nielson et al. (2010) noted traditional classrooms that utilize lecture-centered teaching methods lacked the adequate conceptual tools needed to meet the demands of today's employment needs.

In response, a student-focused approach to teaching is gaining popularity. Struyven, Dochy, and Janssens (2010) explained that student-focused teaching is led by constructivist action-teaching methods. The constructivist perspective views learning as an experiential process (Tam, 2000). Active learning strategies engage students by having them learn through discovery (Struyven et al., 2010). This student-focused approach has been shown to promote deeper learning in students resulting in higher quality outcomes and grades (Prosser, Ramsden, Trigwell, & Martin, 2003).

The objective of this study was to measure the effectiveness of an alternative teaching approach based on constructivist ideas to address the low student achievement and engagement in undergraduate level psychology courses in a four-year university located in the south Pacific. The intervention utilized an active-learning teaching strategy called standards-focused project-based learning (PBL). PBL is an innovative approach where students drive their own learning through inquiry, standards alignment, and collaborative research (Markham, Larmer & Ravitz, 2003; Bell, 2010). Multiple-choice examination scores and qualitative data obtained from student focus groups, and field notes from the two participating professors, provided triangulation and the means of assessing and the overall effectiveness of this intervention.

This action research study is unique in that it looks to assess the effectiveness of a project-based learning curriculum model utilizing the course's learning outcomes as its foundation in university-level

psychology courses. Majority of the literature on PBL is based in the K-12 setting. Published studies on the effectiveness of PBL in the higher education setting primarily focused on the fields of medicine, engineering, mathematics, and computer science. For example, Thomas (2000) identified three studies that spoke to the efficacy of project-based learning. In three elementary schools in Dubuque, Iowa they were able to raise their IOWA Test of Basic Skills scores from "well below average" to the district average in two schools and to "well above the district average" in the third over a three-year span. In addition, during those three years two of the elementary schools were able to raise their reading gains from 15% to over 90% (p. 9). In an inner city Boston middle school, a project-based learning program called Expeditionary Learning was implemented. The eighth graders in this school "exhibited the second highest scores in the district on the Stanford 9 Open Ended Reading Assessment (p. 9). Similarly, in Maine, a middle school that implemented a project-based learning model "showed significant increases in all achievement areas on the Maine Educational Assessment Battery after only one year using this approach (1995-1996). The gains made by this school were three to ten times higher than the state average" (p.10).

Research conducted by Nielsen et al. (2010) found that project-based learning is an effective teaching model for engineering education students. The engineering students were able to achieve process skills (e.g., collaborative skills, project management skills, were able to display evidence of innovation and creativity) and reported felt more motivated to learn actively engage the outside sources to accomplish the requirements of the project. Similarly, Wood (2003, p. 330) concluded that PBL was a more effective way of delivering medical education due to its "principles in adult learning theory, including motivating the students, encouraging them to set their own learning goals, and giving them a role in decisions that affect their own learning."

Nielsen et al. (2010) identified a limitation to this approach that can be generalized to other subject matters is that it can be difficult having students from different educational backgrounds, different life experiences, and different perceptions of learning work together to assimilate their thinking and knowledge into a single project or problem. Barrows (2002) summarizes the key points of PBL that allows it to transfer across disciplines. PBL focuses on a real-world problem, learners must assume responsibility for their own learning, the teacher's role becomes that of a guide or facilitator, and the deliverable must relate the learner's life and/or career (Barrows, 2002). What is also known is that a high level of awareness and a conscious effort to effectively communicate is critical in the success of this approach. This action research study fills this gap for PBL literature by empirically showing PBL's efficacy in the field of social and behavioral science.

Method

In order to address the challenge of low student achievement and decreasing student engagement, two research questions were developed for this action research study. The first question asked,

- "What is the difference in standard, multiple-choice examination scores between students in a lecture-based psychology class and students in a PBL psychology class?" The second question asked,
- "What kind of change can be brought about by engaging psychology students in PBL?"

Research design

This action research study took place at a four-year university in two sections of a first-year psychology course and in two sections of a second-year psychology course. A standards-focused PBL curriculum

that was developed by the Buck Institute for Education (BIE) was introduced to one section of each course. The remaining two sections were considered the control groups and followed a lecture-based curriculum. The design and development of this study was grounded in the philosophy of action science where it is believed that research is conducted for the purpose of generating meaningful change (Argyris & Schon, 1996). More specifically, the Action Research Paradigm Protocol (ARPP) was used as the framework for developing this study. The ARPP consists of 10 steps, also known as the action research inquiry cycle. The steps are (a) diagnose the problem, (b) generate alternatives, (c) design action plan, (d) implement action plan, (e) collect and analyze data, (f) dialogue about process and findings, (g) evaluate outcomes, (h) reflect or dialogue on results, (i) recommend or decide on next steps, and (j) communicate results (Capella University, 2012). The assessment for this study integrated quantitative and qualitative data and their respective analyses for the purpose of understanding the problem of this study and to determine if this intervention is an effective alternative to increasing academic performance and student engagement in the classroom.

Sampling method

As the primary stakeholder of the results of this study, this researcher's positionality as a scholar-practitioner is a key element of action research (Herr & Anderson, 2005). Since the purpose of this action research study was to determine an alternate pedagogical approach to increasing student achievement and classroom engagement in the researcher's class, utilizing a convenience sample that consisted of this researcher's students was found to be appropriate. Although a convenience sample is commonly defined as a sample that is easiest to access, having the students of the researcher be involved appropriately addressed this study's two research questions by providing useful qualitative (i.e., student feedback) and quantitative (i.e., multiple-choice examination scores) data directly from this study's target population. In order to increase this study's transferability to classrooms not directly influenced by the researcher, a second instructor following the same methodology was used.

The inclusion criteria for this convenience sample were students (18 years of age or older) enrolled in one of two sections of this researcher's first-year psychology course and students enrolled in one of two sections of a participating instructor's second-year psychology course. Due to the first-year psychology course being a prerequisite for the second-year psychology course, no students were enrolled in both psychology courses at the same time. The only exclusion criterion was that all participants had to be 18 years of age or older.

Sample size

The sample size was 101 undergraduate psychology students, 54 students in the first-year course, and 47 students in the second-year course. The student population at this research site consists of 68% females and 32% males. Sixty-seven percent is Asian/Pacific Islander, 17% White, non-Hispanic, 6% Hispanic, 4% African-American, and 6% other. The diversity within the sample groups was representative of this. Participate information is shown in Table 6.

Procedures

Based on the standards-focused project-based learning model that was developed by Markham et al. (2003) the following procedures were implemented

1. Both first- and second-year psychology courses included two sections. Section 1 of each course was taught with a lecture-based course design and section 2 was introduced to the standards-focused project-based learning pedagogical model.

2. Both courses are 15-week undergraduate level courses. The student learning outcomes for both courses are the foundation for the learning objectives of the assigned project.
3. Students in the experimental sections created groups of 4-5 students. Each group was provided the applicable student learning outcomes and a driving question that guided the student groups in the development of their project.
    a. The driving question was: How has human's understanding of the brain and its functioning changed in relation to the maturation of the field of psychology?
    b. The student learning outcomes that will be assessed were: (1) Demonstrate an understanding of the use of scientific methodology and research for investigating important questions relative to human behavior as evidence in the supporting data for this Project 1 presentation; (2) Demonstrate an understanding of the history of psychology and knowledge of the formative and influential psychologists who developed the field as evidence in the supporting data for this Project 1 presentation; (3) Demonstrate an understanding of Evolutionary theory and its importance for understanding the field of psychology as evidence in the supporting data for this Project 1 presentation; and (4) Demonstrate an understanding of the biological foundations of behavior as evidence in the supporting data for this Project 1 presentation.
4. The projects were to be developed using a form of technology (e.g., PowerPoint, Keynote, Prezi, and/or a custom video) as its foundation to simulate a real-world presentation environment.
5. During class in the experimental section, student groups worked on their projects. The respective instructor met with each group for approximately 10 minutes providing them with consultation on their project. Consultation consisted of reinforcing foundational content knowledge, facilitating and stimulating group discussion, and ensuring the linkage between the student learning outcomes and the focus of each group's project. The objective was to have the experimental group actively engage course content through meaningful application. The control group followed a lecture-based teaching model and was not assigned a group project. The objective for the control groups were to passively absorb course content, which is typically experienced in a lecture-focused curriculum.
6. In the experimental section, each group presented their project on a predetermined presentation date as stated in their respective course syllabus. The respective instructor determined the order of presentations by each group. Applicable examination chapters were reviewed in class for the control group.
7. Both the control and experimental groups were administered the same multiple-choice examination on the same day.
8. After completing the examination, focus groups involving consenting participants were conducted. At the focus groups, participants reflected on their class experience by discussing what they thought was effective in support of their learning, if the intervention increased their engagement with the course and the course material, and what they felt needed improvement or modification. A separate individual not associated to this action research study moderated the focus group.

Instrumentation

Change in student perceived behavior was assessed quantitatively and qualitatively. This action research study consisted of two samples (a) one control group and one experimental group in a first-year psychology course, and (b) one control group and one experimental group in a second-year psychology course. The control groups were taught using the traditional lecture-focused pedagogy. The experimental groups were taught using the standards-focused PBL pedagogical model that utilized a form of technology as its foundation and a way to enhance and emphasize the level of learning that occurred. The first-year psychology courses' control and experimental groups took the same content knowledge multiple-choice examination on the same day. The second-year psychology course control and experimental groups took the same content knowledge multiple-choice examinations on the same day.

At the conclusion of each class, in both the control and experimental sections of the first-year psychology course and the second-year psychology course, this researcher and the participating instructor documented (if applicable) observations made, milestones accomplished, procedures followed (according to the study's design), and general thoughts.

After completing the multiple-choice examination, students from all four sections were invited to participate in a focus group where they had an opportunity to share and reflect on their class experience by discussing what they thought was effective in support of their learning, if the intervention increased their engagement with the course and the course material, and what they felt needed improvement or modification. Information pertaining to each instrument is as follows:

Multiple-Choice examination

The mean score from both the control group and the experimental groups was compared and quantitatively analyzed using a one-way analysis of variance (ANOVA) to determine if a statistical difference existed between the mean scores. The first examination of both courses was used to measure content knowledge quantitatively. Descriptions of both examinations are located in Table 1.

Table 1 Description of Multiple-Choice Examinations

Course	*Number of Questions*	*Reliability*	*Source of Questions*
First-Year Psychology Course	50	Average reliability coefficient (KR20) = .86	All questions were generated using the publisher's supplemental test bank.
Second-Year Psychology Course	50	Average reliability coefficient (KR20) = .78	All questions were generated using the publisher's supplemental test bank.

Field notes

An analysis was conducted to identify patterns of behavior that occurred in both the control and experimental groups. This data was compared to the focus group data to qualitatively assess student interaction and engagement. Field notes consisted of the course instructors' documentation (if

applicable) of observations made, milestones accomplished, procedures followed (according to the study's design), and general thoughts after each class.

Focus groups

Thematic coding and analysis was conducted to identify strengths and weaknesses of the learning process immediately following the participating students' first examination. Individual anecdotal information obtained was used to provide breadth and depth for the quantitative findings. A separate individual not associated to this action research study facilitated the focus groups. A field test was conducted on the focus group questions and the approved questions are the following

1. How well were you prepared for the exam?
2. What do you attribute your level of preparation and learning to?
3. What supported your learning?
4. What could have been improved?
5. Did the course instructor effectively facilitate the learning process for you?
6. In response to item 5, if you answered yes, in what way did the course instructor effectively facilitate the learning process for you?
7. In response to item 5, if you answered no, what could have been improved?
8. How much were you engaged (i.e., level of investment in classroom experience) in class?
9. If you were engaged in class, what motivated you to be engaged?
10. If you were not engaged in class, what could have been improved to raise your engagement?
11. Have you been engaged in this course outside of class (e.g., read the textbook, reviewed class material, participated in study groups, did personal research on course content)?
12. If you were engaged outside of class, what motivated you to be engaged?
13. If you were not engaged outside of class, what could have been improved to raise your engagement?
14. In your opinion, did you contribute to the learning experience of your peers?
15. In response to item 14, if you answered yes, in what way did you contribute to the learning experience of your peers?
16. If you answered no to item 14, what could have been improved?
17. Is there anything else you would like to share about your experiences in this class?

Results

The source of the data was derived from the following: (a) multiple-choice examinations, (b) instructors' field notes; (c) and student focus groups.

Examination scores

A one-way analysis of variance (ANOVA) was conducted to evaluate the causal relationship between the standards-focused project-based learning pedagogical approach and the change in academic achievement. The independent variable was the standards-focused project-based learning curriculum. The dependent variable was the examination scores. Refer to Table 2 for the descriptive statistics of the sample groups. A confidence interval of 95% was used throughout this analysis. The ANOVA was significant, $F(3, 97) = 12.912$, $p < .01$. Refer to Table 3 for the results.

Because the overall *F* test was significant, follow-up tests were conducted to evaluate pairwise differences among the mean scores. The Levene Statistic was used to test for homogeneity of variances and that resulted in $p = .748$. The Levene Statistic is a statistical formula that is designed to evaluate the assumption that the population variances for the sample groups are equal" (Green & Salkind, 2008, p. 179). If the *p* value of the Levene Statistic is significant then it can be concluded that the assumption of equality-of-variance is violated. Significance was not established due to the *p* value being greater than the confidence level of .05. As a result, it can be assumed that the equality-of-variance assumption has not been violated. Refer to Table 4 for the result.

Since the equality-of-variance assumption was not violated, a post hoc comparison was made using the Tukey HSD test. The Tukey HSD test is a statistical formula designed to conduct paired comparisons between three or more sample groups when the equality-of-variance assumption is not violated. This test is designed to control for a Type I Error (i.e., false positive – incorrect rejection of the null hypothesis) (Green & Salkind, 2008). There was significant difference between the mean examination score of the experimental section of the first-year psychology class when compared to the control section of first-year psychology class, the control section of second-year psychology class, and the experimental section of second-year psychology class. No significant differences were found when comparing the other mean examination scores. Refer to Table 5 for the results.

Table 2 Descriptive Statistics

	N	*Mean*	*Std. Dev.*	*Std. Error*	*95% Conf. Int. Lower Bound*	*95% Conf. Int. Upper Bound*
First-Year Psychology Course Control Section	26	32.7308	6.98889	1.37063	29.9079	35.35536
First-Year Psychology Course Experimental Section	28	39.3214	6.86404	1.29718	36.6598	41.9830
Second-Year Psychology Course Control Section	21	29.6667	6.44464	1.40633	26.7331	32.6002
Second-Year Psychology Course Experimental Section	26	29.2692	6.23896	1.22356	26.7493	31.7892
Total	101	33.0297	7.75430	.77158	31.4989	34.5605

Table 3 One-Way ANOVA Results

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Between Groups	1715.906	3	571.969	12.912	.000
Within Groups	4297.005	97	44.299		
Total	6012.911	100			

Table 4 Test of Homogeneity of Variances Result

Levene Statistic	*df1*	*df2*	*Sig.*
.407	3	97	.748

Table 5 Tukey HSD Results

	Group	*Group*	*Mean Diff. (I-J)*	*Std. Error*	*Sig.*	*95% Conf. Int. Lower Bound*	*95% Conf. Int. Upper Bound*
First-Year Psychology Course Control Section	1	2	-6.591*	1.8872	.002	-11.7690	-1.412
		3	3.0641	1.9638	.401	-2.3862	8.5144
		4	3.4615	1.8373	.245	-1.5923	8.5153
First-Year Psychology Course Experimental Section	2	1	6.5907*	1.8872	.002	1.4123	11.770
		3	9.6548*	7.9132	.000	4.3546	14.955
		4	10.052*	1.7832	.000	5.1606	14.944
Second-Year Psychology Course Control Section	3	1	-3.0641	1.9638	.401	-8.5144	2.3862
		2	-9.655*	1.9132	.000	-14.9549	-4.355
		4	.3974	1.8641	.997	-4.7813	5.5762
Second-Year Psychology Course Experimental Section	4	1	-3.4615	1.8373	.245	-8.5153	1.5923
		2	-10.05*	1.7832	.000	-14.9438	-5.161
		3	-.3974	1.8641	.997	-5.5762	4.7813

*The mean difference is significant at the .05 level.

Table 6 Description of Participants

Course	Full Consent	Consent Excluding Audiotape	No Consent
First-Year Psychology Course Control Group	21	5	4
First-Year Psychology Course Experimental Group	24	4	1
Second-Year Psychology Course Control Group	18	3	1
Second-Year Psychology Course Experimental Group	22	4	1

Focus groups

Based on the thematic coding obtained from the transcripts of the focus groups, three primary themes of student behaviors were found. They were (a) Positive influence of peer pressure, (b) Students' dependence on instructor-developed study tools, and (c) Students driven by an external locus of control. The results of these themes are shown below.

Theme 1 positive influence of peer pressure

The belief that success is possible is a critical first step in the learning process. The results were mixed when participants reported on their confidence level prior to their respective examination.

Approximately 41% of all participants felt that they were prepared and that they would do well on the examination. For participants from the two control sections, their level of preparation aligned with behaviors such as (a) reading the textbook, (b) regular class attendance, and (c) reviewing other sources of information. Common statements pertaining to why they did not feel prepared for the examination included, "I only skimmed the book," "I only studied the night before," and "I should have attended class more." When asked about their interaction with their fellow learners, only 4 out of 32 participants felt that they contributed to the learning of their peers.

For the experimental sections 79% of participants in the first-year psychology class felt prepared, while no participants from the second-year psychology class did. Participants in the first-year psychology class aligned their level of preparation to behaviors such as (a) group collaboration, (b) reading the textbook, (c) completing the group presentations, and (d) doing outside information gathering. Participants from the second-year psychology classes focused their comments on what they felt was missing, primarily the lack of a study guide. When asked about their interaction with their fellow learners, 19 out of 26 felt that they contributed to the learning of their peers.

Theme 2 students' dependence on instructor-developed study tools

Transitioning first-year higher education students are faced with increasing expectations as greater emphasis is placed on academic performance, increased competition, unfamiliar academic tasks, the

need to socialize with new peer groups, and an increased focus on career. Perry (1991) initially identified this as a period when students may lack a sense of control over their environment. The literature focused on the importance of a student's perception of being in control over his or her learning environment. For the two control sections, their feedback was consistent with the literature. Participants sought more direction in how to prepare for the examination. "I find it hard to study with no study guide for direction" and "I wanted to be given the exact definitions along with the application of real life situations" were common statements made. Participants wanted more class discussions and group work.

Participants from the experimental groups sought more structure. The majority of participants wanted to spend more time going over specific material in the test and felt uncomfortable in this type of learning environment. "I wanted more instruction" and "I wanted more boundaries to what we needed to know" were common statements made. Although the vast majority of students wanted more specific direction on how to do well on the exam, participants also expressed their appreciation for the time that they had interacting with their peers and the course instructor in their groups. "I liked how the professor let us learn on our own and find information ourselves." "The professor focused individual attention to our group and helped us."

Theme 3 students driven by an external locus of control
Harlen and Deakin Crick (2002, p. 2) "define motivation as a force that drives an individual's capacity to learn, adapt, and change in response to internal and external stimuli. Motivation is closely identified with the will to learn, and that has been shown to determine the amount of effort that a learner will put into a task." All but two participants in the control group reported that their primary motivation for their respective course was their final grade. Only 4 out of 23 participants in the control groups reported feeling engaged in class. Participants expressed that when "fun activities" occur they are more motivated to come to class.

The participants in the experimental sections did not find it as challenging to come to class regularly. Nineteen out of 26 participants felt engaged in class and 22 out of 26 participants were engaged in the coursework outside of class. A common reason expressed by participants is that they were motivated by their peers to participate and to get a good grade. The group dynamic was found to be influential to the thinking and behaviors of participants. "I was motivated to work outside of class because I did not want to let my group down." "I like working in groups. It is more fun than reading the text alone and it gives me motivation." The project itself also helped with motivation and class engagement. "I was pretty engaged in class. I felt that the topic being discussed in my group was interesting and relatable."

Field notes
At the conclusion of each class, the course instructor documented their observation of the class, milestones accomplished, procedures followed, and general thoughts about the class. After reviewing both sets of field notes, there appears to be congruency between the experiences of the two course instructors.

Control groups
A lecture-focused teaching approach with the incorporation of two videos was used for the control groups. Participants in the control sections were passive and spoke in class when prompted by the

respective instructor. Participants were observed to be more attentive when real world stories were incorporated into the lectures. One of the instructors noticed many blank stares when going over more complex theories or concepts. In addition, the use of videos did not prove to be effective as a number of participants were observed falling asleep, attempting to covertly use their personal electronic devices, and/or staring blankly at the screen. A general concern by both instructors was if the participants understood the content of the lectures despite the fact that they all were given the same information.

Experimental groups

For the experimental groups both instructors had much different experiences when compared to their respective control group. Both instructors observed a higher level of energy in the classroom. Participants appeared engaged in the process and actively discussed the topics within their respective groups. One instructor noted that he felt as though he was teaching more in this format because he could get immediate feedback if the participants understood the material or not. In addition, participants were directed to relate the textbook information with real world situations. This led too much deeper conversations that were more meaningful to the participants because they were discussing class content in the context of their own personal inquiry. Participants were observed using a number of outside sources to add to their projects. Many groups requested to use the resources at the campus library to build their projects. Participant groups interacted well with their respective instructors when they met during class for consultation.

One challenge that was observed in both experimental groups was that the participants had a very difficult time starting their projects. They expressed their confusion and uncertainty. Many groups requested examples and wanted more specific direction as to what their respective instructor was grading them on. Early consultation focused on providing foundational content knowledge needed to get the participant groups thinking about their project. What was evident early on was that the openness of possibilities for the project created anxiety amongst many of the participant groups. Majority of the groups requested more structure and did not respond well when informed that they needed to be creative and innovative in their approach. All of the groups required assurances that the direction they were going with the project was okay with their respective instructor. This was found to be important as many of the groups' initial project designs was summarizing the assigned chapters on Microsoft PowerPoint. These groups required additional support and reassurance to trust themselves and their ability to discover new information from other sources. Once all of the groups felt confident in their thinking their energy level and enthusiasm increased. Subsequently, their projects began to evolve from summaries to innovative and thoughtful deliverables. Because creativity and innovation was stressed, participants were also very eager to see what the other groups came up with.

Discussion

Upon reflection of this study's findings, it became evident that the mindset of the student was a critical factor in their ability to perform at a high academic level. Students who adopted an active and effortful learning approach were found to have scored better then students who did not. Dweck (2008) discovered that people with a growth mindset, those that believe skills and knowledge can be learned and developed, perform better than those with a fixed mindset. Those with a fixed mindset believe that their intelligence and skills are fixed traits that are innately determined. Students from this study who believed that they could learn the material and congruently dedicated themselves to increasing

their knowledge of the material aligned with Dweck's growth mindset. Based on the results, these growth mindset students performed significantly better than those that did not.

Another factor that needs further consideration is the attitude students expressed about feeling lost and helpless because their instructor did not provide a study tool for them (e.g., a study guide, examples of projects, and detailed instructions). Castella, Byrne, and Covington (2013) found that students who developed a sense of helplessness and low self-efficacy run the risk of falling into maladaptive coping mechanisms such as self-handicapping. Self-handicapping was positively correlated with a student's fear of failure and negatively correlated with the clarity of instructions at the time the assignment was assigned (Castella, et. al, 2013). As seen in the results, students who had an external locus of control and relied solely on the direction and aid of their instructor reported a higher level of procrastination and lack of preparedness, which are forms of self-handicapping.

Research question 1

The response to the first research question is mixed. In the first-year psychology classes, the results were significant. The first-year psychology control section had a mean score of 32.73 out of 50 possible points on the examination, while the experimental section had a mean score of 39.32 aligning with the literature that reported that an active-learning approach was related to higher quality outcomes and grades (Prosser et al., 2003). The second-year psychology classes showed no significant difference in mean scores as the control group had a mean score of 29.67 out of 50 total possible points and the experimental group had a mean score of 29.27. The findings from this study was similar to the study conducted by Gijbels, Van de Watering, Dochy, and Van den Bossche (2005), where no statistical significance was determined in mean scores of a multiple-choice examination given to undergraduate law students. An explanation to this finding was identified when Gibjels et al. further analyzed their findings.

Gibjels et al. (2005, p. 333) discovered that 23% of the participants lacked the metacognitive skills to evaluate how functional their study practices were in their learning environment and admitted to having problems with their study strategy. Many of the students realized that their study methods were not suitable for studying law, but they did not know how to develop them.

In order to understand why there was a significant difference in the mean examination scores of the two first-year psychology classes and not when comparing the two second-year psychology classes lies in the attitudes and mindset reported by the participants. Students who take an active role in their own education have been found to be better at monitoring and regulating their own motives and learning strategies, when compared to students who are engaged in passive learning pedagogy (Bell, 2010; Lietz & Matthews, 2010). This was observed in the first-year psychology control and experimental sections. The control section participants expressed their challenges with properly preparing for the examination. On the contrary, many of the participants in the experimental section reported how the group dynamic assisted them in preparing for the exam. They did not want to disappoint or inconvenience their group members. Twelve out of the 14 participants in the focus group reported that they felt that they contributed to the learning of their peers. The depth of learning that occurred in the project groups could be one reason why 11 out of 14 of the participants in the first-year psychology experimental section felt prepared entering the examination.

An interesting finding was that 7 out of 11 participants in the first-year psychology control section felt prepared for the examination, but only two out of the 11 participants in the first-year psychology control section felt that they contributed to the learning of others. It appeared that the participants in this class primarily studied alone. There was no evidence of participants supporting other participants. The apparent overconfidence, minimal out-of-class preparation, and limited to no support from their peers could all be reasons why this class averaged 33 out of 50 possible points on the examination (66% or a D grade).

The focus group data showed that the perceptions of learning were very similar in both the second-year psychology classes. Their external locus of control dictated their behavior and influenced how much time and energy they spent preparing for their examination. There appears to be a very strong dependency and expectation that the course instructor will provide for the participants the specific detailed knowledge needed in order for them to do well on the examination.

Overall, there was more negativity being verbalized in the second-year psychology course focus groups than from the first-year psychology course focus groups. One possible reason is that the second-year psychology course participants are primarily second-year students who may have developed expectations on how course instructors should behave and any incongruency between their present experience and their expected experience resulted in frustration which led to a lack of engagement due to the blame being placed on external forces beyond their perceived control. This aligned with Stupnisky et al. (2007) who found that students who felt out of control typically blamed an external source for failures (e.g., their professor or the subject matter).

Research question 2

This action research study has shown an increase in classroom engagement and academic performance is possible when using the standards-focused PBL teaching approach. There are two factors that influenced the outcome of this approach.

One factor is a student's need for predictability. Both control groups reported feeling that their course instructors taught the course effectively and they had no complaints about the lecture-based teaching approach. Yet, they both did not do well on the examination with averages of a D grade (first-year students) and F grade (second-year students).

The attitude expressed from the participants of the control sections was very different from the two experimental groups. The literature stated an active approach to learning has been shown to have significant impact on student satisfaction with their overall educational experience, enthusiasm to learn, and willingness to attend class on a regular basis (Lieux, 1996; Savery, 2006; Shellman and Turan, 2006). The findings from this study did not align with the literature. The assumption that the participants would be open to a new teaching approach was proven to be a wrongful assumption. Both experimental groups sought more structure and reported wanting more boundaries and instruction. The participants in the experimental groups were shown how the learning outcomes were directly linked to the project's grading guide (i.e., rubric) and to the examination, but had difficulty seeing and conceptualizing this. Participants were primarily focused on finding out what they needed to know for the examination.

Despite their similar attitudes, the first-year psychology course experimental section averaged a C grade on the examination while the second-year psychology course experimental section averaged an F grade. Based on a normal distribution curve, the first-year psychology course mean score (39 out of 50 possible points or a 78%) is considered above average. The second-year psychology course mean score (29 out of 50 possible points or a 58%) is considered below average. Both groups adopted a negative attitude when presented with the alternative method of learning. After the initial confusion, the first-year psychology course experimental section embraced the group dynamic and used it to enhance their learning experience. The majority of the participants felt peer pressure to not let down their group members and many sought assistance from one another when studying for the examination. This shift in attitude was not observed in the second-year psychology course experimental section. They viewed the group project as unnecessary and completed the task because it was a graded assignment. Both course instructors reported a high level of engagement from students in their respective experimental sections when compared to their respective control sections. Apparently, what the course instructors perceived as positive engagement, the students negatively perceived as work.

The second influential factor has to do with preparation. Upon reflection of the findings, the two instructors agreed that an approach like this is appropriate for students who have the foundational knowledge needed to critically think about the subject matter. In the experimental design, this was addressed during group consultation. Yet, it did not appear to be enough. Either a flip classroom approach needs to also be added or time in class needs to be allocated for the dissemination of foundational content needed to progress in the development of their project. Students' self-efficacy and perceived control of their learning has been found to be critical factors in the support of the growth mindset and ultimately their ability to academically perform at a high level.

Another factor that should be considered was the perceived level of intimidation the project had on the students. Assignments that are perceived as large or time consuming tend to cause anxiety in students. Anxiety causes our limbic system to become aroused, which subsequently activates our sympathetic nervous system, or otherwise known as our flight or fight response. In addition, the aroused limbic system inhibits the functioning of our prefrontal cortex, which is where our rational thought exists (Michalski & Shackelford, 2010). In this state, students will feel fearful and/or angry. This aligned with the displeasure voiced from the students (fight response) and/or the lack of observed action to begin working on the project and/or studying for the exam (flight response). A possible solution is assisting students in breaking down the project and the studying process for the exam into smaller steps. This researcher is interested in looking further into a Japanese practice called Kaizen because of this realization. Translated, Kaizen means "change for better" and its core practice is taking small steps in order to achieve large goals (Maurer, 2014, p. 25). Maurer (2014) reported that by taking small steps, a person's limbic system does not get aroused because the level of change is not large enough to generate fear and anxiety. Kaizen has been well researched within the field of business and it successes have been well documented. The transferability and applicability of this practice to the fields of education, counseling, and the social sciences needs to be further researched.

Based on the triangulation of the three data sources, the standards-focused project-based learning approach has the potential to increase student engagement and academic performance. Students that possess a high degree of self-efficacy, perceived control, open to group work, and have a growth mindset have the greatest potential for deep learning because they will be able to scaffold the real-world knowledge gained from the development of the project and be able to apply it to an exam.

Students with a fixed mindset, low self-efficacy, and have an external locus of control will require a higher level of consultation in order to succeed.

Limitations

This action research study was limited by its relatively small sample size. By utilizing a larger sample size at various levels (first-year, second-year, third-year, and fourth-years and higher) and from additional institutes of higher education, the transferability of this study will increase.

The standards-focused project-based learning curriculum does not seem possible for classes typically held in traditional lecture halls that accommodate larger numbers of students. This model appears limited to a smaller class size due to the required small group sizes and the amount of time required of the course instructor to spend with each group during each class period.

Recommendations for further research

Recommendations for further research emerging from this action research study include

1. Future action research cycles should collect and analyze data over a longer period of time (e.g., the entire semester) versus just the first five weeks of the semester;
2. The participants stressed the importance of getting a good grade in the class, but their behavior was incongruent to their goal. Many comments heard in the focus groups placed blame on their course instructors as to why they did not feel prepared for the examination. A future study looking into developing intrinsic motivation and an internal locus of control in students would help in addressing concerns over student academic achievement;
3. A study that analyzes the effectiveness of a model like Kaizen and its effect on academic performance, anxiety, and self-handicapping; and
4. A study that focuses on the teaching of the growth mindset and its effect on academic performance of a diverse student population.

Conclusion

The primary objective of this action research study was to identify an alternate pedagogical approach to improve student engagement and academic performance in this researcher's psychology courses. The chosen alternate teaching approach to traditional lectures was the standards-focused project-based learning model.

This study found one instance that showed a significance difference in the examination scores of participants in a lecture-based psychology class (first-year psychology course control group) when compared to an active-learning psychology class (first-year psychology course experimental group) that utilized the standards-focused project-based learning curriculum. The first-year psychology course experimental section's mean examination score was found to be significantly higher using a 95% confidence interval than the mean examination scores of the first-year psychology course control section. When analyzing the data from the other psychology class (second-year psychology course), no significance was found.

Since the first-year psychology course showed significance and second-year psychology course did not, a number of possible reasons explaining this occurrence was mentioned. Possibilities included (a) participants receiving a dissonant teaching approach, (b) participants feeling that their learning expectations were not met, and/or (c) a resistance to the nontraditional teaching intervention. Further

inquiry into why no significance was found introduces further research needed to address the identified problem of low student engagement and decreasing academic performance in psychology classes.

Behavioral changes in the participants introduced to the standards-focused project-based learning curriculum were observed. Participants in the experimental groups were observed being highly engaged in and out of the classroom. Although both course instructors viewed this positively, participants' feelings towards this behavioral change were mixed. Participants from the first-year psychology course experimental section were initially resistant, but later embraced the group environment and utilized their peers to gain a deeper understanding of the content. Participants from the second-year psychology course experimental section displayed an external locus of control and viewed the project-based curriculum as not relevant to their primary concern, which was passing the multiple-choice examination. This group did not accept the alternate approach and remained resistant throughout the study. These findings emphasized the importance of the student's perception of learning and its influence on academic performance and motivation.

Based on the findings, PBL has the potential to improve student engagement and their academic performance. Student buy-in is critical and in order to create a safe and predictable environment for them the instructor should do the following:

1. Focus on the student's declarative knowledge with an emphasis on course content directly related to the student learning outcomes;
2. Introduce the relevance of the project early on so the students can understand the link between the student learning outcomes, course content, the group project, and then to the summative assessment;
3. Utilize the group project as evidence of the students' procedural knowledge; and
4. During consultation, reinforce the relevance of the group project and how it relates to the course, their career, and their personal life.

The students' perception of control and their self-efficacy were critical variables in this study. By understanding this, I have concluded that best practice cannot be realized without first establishing a collaborative relationship with the students.

References

Argyris, C., & Schon, D.A. (1996). *Organizational learning II: Theory, learning, and practice.* Reading, MA: Addison-Wesley.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W.H. Freeman.

Barrows, H. (2002). Is it truly possible to have such a thing as dPBL?. *Distance Education*, *23*(1), 119-122.

Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *Clearing House*, *83*(2), 39-43. doi:10.1080/00098650903505415

Biggs, J.B., Kember, D., & Leung, D.Y.P. (2001). The revised two-factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology. 71*(1). 133-149.

Brown, J. (2006). New learning environments for the 21st century: Exploring the edge. *Change*, *38*(5), 18-24.

Capella University. (2012). *Action research paradigm protocol*. Retrieved from https://media.capella.edu/CourseMedia/ELM8102/actionResearchModel/actionResearch_wrapper.asp

Daly, A. L., & Pinot de Moira, A. (2010). Students' approaches to learning and their performance in the extended project pilot. *Curriculum Journal*, *21*(2), 179-200. doi:10.1080/09585176.2010.480839

De Castella, K., Byrne, D., & Covington, M. (2013). Unmotivated or motivated to fail? A cross-cultural study of achievement motivation, fear of failure, and student disengagement. *Journal of Educational Psychology*. 105(3). 861-880.

Dweck, C. S. (2008). *Mindset: The new psychology of success.* New York: NY: Ballantine Books.

Gijbels, D., Van de Watering, G., Dochy, F., & Van den Bossche, P. (2005). The relationship between students' approaches to learning and the assessment of learning outcomes. *European Journal of Psychology of Education, 20*(4), 327-341.

Green, S. B. & Salkind, N. J. (2008). *Using SPSS for windows and macintosh: Analyzing and understanding data* (5th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Harlen, W., & Deakin Crick, R. (2002). *A systematic review of the impact of summative assessment and tests on students' motivation for learning (EPPI-centre review, version 1.1).* London, UK: EPPI-Centre, Social Science Research Unit, Institute of Education.

Herr, K. & Anderson, G. L. (2005). *The action research dissertation: A guide for students and faculty.* Thousand Oaks, CA: Sage.

Lietz, P., & Matthews, B. (2010). The effects of college students' personal values on changes in learning approaches. *Research in higher education*, *51*(1), 65-87. doi:10.1007/s11162-009-9147-6

Lieux, E. M. (1996). A comparative study of learning in lecture versus problem-based learning. *About Teaching 50*(1), 25-27.

Markham, T., Larmer, J., & Ravitz, J. (2003). *Project based learning handbook: A guide to standards-focused project based learning for middle and high school teachers* (2nd ed.). Novato, CA: The Buck Institute for Education.

Maurer, R. (2014). *One small step can change your life: The kaizen way.* New York, NY: Workman Publishing Co, Inc.

Michalski, R. L. & Shackelford, T. K. (2010). *Evolutionary personality psychology: Reconciling human nature and individual difference.* Personality & Individual Differences, 48(5), 509-516. Doi:10.1016/j.paid.2009.10.027

Newell, R. J. (2003). *Passion for learning: How project-based learning meets the needs of 21st – century students*. Lanham, MD: Rowman & Littlefield Education.

Nielsen, J. D., Du, X. Y., & Kolmos, A. A. (2010). Innovative application of a new PBL model to interdisciplinary and intercultural projects. *International Journal of Electrical Engineering Education*, *47*(2), 174-188.

Nist, S. L., & Simpson, M. L. (2000). College studying. In M. Kamil, P. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of reading research*, (Vol. III, p. 645-666). Mahwah, NJ: Erlbaum.

Perry, R. P. (1991). Perceived control in college students: Implications for instruction in higher education. In J. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 7, p. 1-56). New York, NY: Agathon Press.

Phan, H. (2010). Students' academic performance and various cognitive processes of learning: an integrative framework and empirical analysis. *Educational Psychology*, *30*(3), 297-322. doi:10.1080/01443410903573297

Prosser, M., Ramsden, P., Trigwell, K., & Martin, E. (2003). Dissonance in experience of teaching and its relation to the quality of student learning. *Studies In Higher Education*, *28*(1), 37-48.

Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning, 1*(1), 9-20.

Shellman, S. M., & Turan, K. (2006). Do simulations enhance student learning? An empirical evaluation of an IR simulation. *Journal of Political Science Education,* 2(1), 19-32.

Simpson, M. L., & Nist, S. L. (2002). Active reading at the college level. In C. Block & M. Pressley (Eds.), *Comprehension instruction: Research-based best practices* (365-379). New York, NY: Guilford Press.

Simpson, M. L., Stahl, N. A., & Francis, M. (2004). Reading and learning strategies: recommendations for the 21st century. *Journal of Developmental Education*, *28*(2), 2-32.

Struyven, K., Dochy, F., & Janssens, S. (2010). Teach as you preach: The effects of student-centred versus lecture-based teaching on student teachers' approaches to teaching. *European Journal of Teacher Education*, *33*(1), 43-64. doi:10.1080/02619760903457818

Stupnisky, R., Renaud, R., Perry, R., Ruthig, J., Haynes, T., & Clifton, R. (2007). Comparing self-esteem and perceived control as predictors of first-year college students' academic achievement. *Social Psychology of Education*, *10*(3), 303-330. doi:10.1007/s11218-007-9020-4

Tam, M. (2000). Constructivism, instructional design, and technology: Implications for transforming distance learning. *Educational Technology & Society*, *3*(2), 50-60.

Thomas, J. W. (2000). *A review of research on PBL*. Retrieved from http://www.bobpearlman.org/BestPractices/PBL_Research.pdf

Thomas, J. W., & Rohwer, W. D. (1986). Academic studying: The role of learning strategies. *Educational Psychologist*, *21*, 19-41.

Wood, D. F. (2003). Problem based learning. *British Medical Journal*, *236(7384)*, 328-330.