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Measurement and analysis of student engagement in university classes where varying levels of PBL methods of instruction are in use

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Students participate more in a classroom and also report a better understanding of course concepts when steps are taken to actively engage them. The Student Engagement (SE) Survey was developed and used in this study for measuring student engagement at the class level and consisted of 14 questions adapted from the original National Survey of Student Engagement (NSSE) survey. The adapted survey examined levels of student engagement in 56 classes at an upper mid-western university in the USA. Campus-wide faculty members participated in a program for training them in innovative teaching methods including problem-based learning (PBL). Results of this study typically showed a higher engagement in higher-level classes and also those classes with fewer students. In addition, the level of engagement was typically higher in those classrooms with more PBL.

Introduction

Engaging students in learning is one of the many goals that educators face. As our world evolves and students' attention spans change, educators must also adapt to meet the changing needs of their students. Changes, adaptations and modifications are occurring in several significant areas of education. Johnson *et al.* (1998) note having the instructor provide all knowledge to the passive student is the old paradigm. The new paradigm is to actively engage students with the material and one another. Educators are finding challenges with the way things are being done and have experimented with and tested alternative methods of teaching (Hake, 1998). In addition, national studies are examining alternative teaching and evaluation of university

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effectiveness in an effort to further understand and improve education (National Survey, 2000, 2001).

In response to these education reform and research demands, this paper reports on a study of university student engagement in classrooms where varying approaches to PBL were being employed by the teachers. The paper examines three relevant areas of education. First, research in physics education is discussed, as this area has well established a standardized national test for measuring conceptual understanding and has test score gains for traditional as well as engaged classes. Second, the National Survey of Student Engagement (NSSE) is discussed, as this instrument has focused on the important issue of how students are utilizing university resources for learning rather than simply reputation of a university, size of a library, alumni giving, etc., and provides the instrument for the analysis. Finally, the problem-based learning (PBL) method of instruction is discussed. As McKeachie and Gibbs (1999) have stated, 'PBL is one of the most important developments in contemporary higher education' (p. 175). The research was carried out to test the engagement of students in the PBL classroom, and involved developing an instrument based on the NSSE instrument. Essentially, engagement is the goal and PBL is the means to reaching the goal, which is why it is important to include literature concerning each of these areas. After discussing each of the above three areas, hypotheses and research questions are posed for analysis.

Engagement research

Physics education

Physics education is one area that has been reforming teaching methods. Many faculty end their physics courses disappointed with the limited ability of their students to apply what they have learned (Redish & Steinberg, 1999). In an effort to remedy this problem, educators have adopted interactive approaches to teaching. Hake (1998) defines interactive engagement methods as those designed to gain a conceptual understanding through heads-on (always) and hands-on (usually) activities that result in immediate feedback with peers and instructors.

Hake (1998) conducted a study using over 6000 students for understanding the effectiveness of interactive engagement (IE). The Halloun–Hestenes *Mechanics diagnostic test*, or more recent *Force concept inventory*, were used to test the 62 introductory physics courses. It was found that IE methods had an average gain of 0.48 ±.0.14 *SD,* which was two standard deviations above the traditional course which received and average gain of 0.23 ±.0.04 *SD*. Bloom (1984, p. 4) states:

> Using the standard deviation (sigma) on the control (conventional) class, it was typically found that the average student under tutoring was about two standard deviations above the average of the control class … The tutoring process demonstrates that most of the students do have the potential to reach this high level of learning. I believe an important task of research and instruction is to seek ways of accomplishing this under more practical and realistic conditions than the one-to-one tutoring which is too costly for most societies to bear on a large scale. This is the '2 sigma' problem.

Also Hake (2001) summarizes lessons from the reform effort in physics education:

> The use of interactive Engagement (IE) strategies *can* increase the effectiveness of conceptually difficult courses well beyond that obtained with traditional methods. The use of IE and/or high-tech methods, by themselves, does *not insure* superior student learning. High-quality standardized tests of the cognitive and affective impact of courses are essential for gauging the relative effectiveness of non-traditional educational method … The development of effective educational methods within each discipline requires a redesign process of continuous long-term classroom use, feedback, assessment, research analysis, and revision. Although non-traditional interactive-engagement methods appear to be much more effective than traditional methods, there is need for more research to develop better strategies for the enhancement of student learning. (pp. 23–30; emphasis in original)

This study explores the variables that influence engagement levels in order to address the research concerns listed above. Variables including class level, enrolment, level of PBL and academic organizational unit (in this study the 'college' is equivalent to a faculty or large school or department in other systems) are all-important components to further understanding engagement level in the university classroom. It was hypothesized that:

Hypothesis 1: As course level increases, engagement level increases.
Hypothesis 2: As class enrolment decreases, engagement level increases.
Hypothesis 3: As PBL increases, engagement level increases.
Research question 1: Which academic college has the highest levels of classroom engagement?
Research question 2: Which of the above four variables best predict ES (engagement score)?

National Survey of Student Engagement

Evaluating higher education institutions has, in the past, been based on indicators ranging from tuition to institutional size and average GPA to average annual alumni salary. Although this information is important, it is also important for institutions to address information related to student engagement in the university environment.

The National Survey of Student Engagement (NSSE) is an ongoing research campaign in the USA used to assess the extent to which colleges and universities are participating in educational practices that are strongly associated with high levels of learning and personal development. NSSE data focus on something far more important, namely *how* students use resources for learning. The survey examines the environment of college students, but is also intended to foster a particular way of thinking and talking about collegiate quality (Kuh, 2001).

The first national report emphasized the important link between effective educational practices and collegiate quality by featuring five benchmarks of effective educational practice. These benchmarks were created using student responses to 40 key items from the original survey. The benchmarks include: level of academic challenge,

active and collaborative learning, student interactions with faculty members, enriching educational experiences and supportive campus environment (National Survey, 2000; Kuh, 2001).

Results of the national survey are highlighted in the NSSE Overview report from 2000 (National Survey, 2000). Multivariate regression analyses for patterns of student engagement reveal significant information about predictive behaviours. Seniors were more engaged than first-year students in good educational practices.

This paper examines the results of a modified version of the NSSE administered in conjunction with a Bush Grant. The Bush Grant that is referred to in this study was used to fund a series of pedagogical training sessions for university faculty at an upper mid-western US university. These training sessions were focused on PBL, an innovative teaching method for engaging students in solving practical and relevant problems. The training and research conducted were all part of American initiatives to better post-secondary, higher learning institutions in the USA. Results of this research can inform other researchers and educators around the world.

The NSSE results are important for establishing the validity and reliability of this study. However, the data collected in this study are not the same data collected from the national study. The data here are specific to one institution alone, which is why it is important to know how the results of this institution compare to that of the national results. This leads us to:

Research question 3: Can a simple instrument be developed from the original NSSE survey to measure the level of student engagement in individual classes and compare the results with related questions on the NSSE survey for universities?

Problem-based learning

The concept of PBL was seen 30 years ago as an alternative to the traditional means of education in medicine. The origins of PBL lie heavily within medical education and much research done on PBL is within medical literature (MacKinnon, 1999; Milligan, 1999; Baker, 2000; Dahlgen, 2000). PBL was introduced in 1969 in Canada's McMaster University Medical School, which included elements of curricular innovations used in a hybrid program from the late 1950's at Case Western Reserve University Medical School (Rahiika *et al.*, 1998; Baker, 2000). Today, elements of these pioneer programs can be found throughout the educational system around the world. PBL has been integrated into numerous areas of study, including dentistry, pharmacy, optometry, nursing, law, business and education (Lohman & Finkelstein, 2000). However, there are many additional areas of study that have yet to make their mark with PBL.

The University of Delaware (UD) can be credited with the incorporation of PBL into their curricula in 1992. The revision began in the Medical Scholars Program. PBL had been used in medical education previous to this time, but not widely known by undergraduate faculty. Because of faculty unfamiliarity and intimidation, an Institute for Transforming Undergraduate Education (ITUE) was

developed. Hundreds of faculty fellows participated in workshops to train and educate on PBL methods. From their inception, the PBL program at Delaware has gained national recognition and remains a model for others (Duch *et al.*, 2001).

The Center for PBL at Samford University was started in 1998. Samford University, funded by two grants from the Pew Charitable Trusts, has incorporated PBL into their undergraduate courses and documented the best models of PBL in their courses (Baldwin & Strickland, 2003).

PBL involves confronting students with a problem related to the class material as opposed to traditional didactic approaches to education (Williams, 1999). The problems that students face in these classroom simulations are loosely-structured situations designed to create an environment that allows students an opportunity to explore and learn (Butler, 1999; MacKinnon, 1999; Lohman, & Finkelstein, 2000). Bridging the theory–practice gap allows for far greater learning and is why PBL has been so highly regarded in recent years. Moreover, when students are provided opportunities to learn material in the contexts where they will be used, they are more likely to retain the information and are better prepared to handle life and its challenges (Albanese & Mitchell, 1993).

PBL is a group-based teaching technique. Groups (typically referred to as learning groups (Lohman & Finkelstein, 2000) or cooperative base groups) are made up of five to eight students to work through the problem together, while using a trained facilitator to guide the learners without teaching them in a traditional manner (Biley, 1999; Baker, 2000). Having someone for the groups to look to for guidance leads to a richer, more holistic level of learning (Dahlgren, 2000). In fact, the 'success of any PBL curricular initiative requires the assistance of faculty skilled in PBL' (Hitchcock, 2000, p. 52). Through the process of working together, learning takes place. The group members interact to solve the problem and this discourse eventually leads to a solution. The discourse within the group 'consists of a dynamic sequence of conversational exchanges that evolves over time as the participants in the group collaborate to develop alternative models of a case and use them in solving a diagnostic problem' (Frederiksen, 1999, p. 137).

Various research studies have explored the sequence for conducting PBL (Rahiika *et al.*, 1998; Biley, 1999), but key elements are characteristic of each. One, PBL is recognized for its shift from focusing on the teacher to a student-centred education with process-oriented methods of learning (Milligan, 1999; Dahlgren, 2000). The primary objective of PBL is to create an environment that allows students to become life-long learners. Because of this process-oriented approach, different instructors apply PBL differently and at various levels of integration. Instructor use ranges from periodic integration with one-class session problems to semester-long projects that require complete emersion in the problem. PBL can be used in the classroom at various levels of the continuum. Two, PBL emphasizes understanding concepts, thinking critically and working collaboratively with others. Self-direction and reflection are key contributors to the process, which is of greater importance then the product (Rahiika *et al.*, 1998; Butler, 1999; MacKinnon, 1999; Milligan, 1999;

Dahlgren, 2000). In the end, synthesis and review are necessary to complete the process including evaluations of self, peer and tutor/facilitator (Rahiika *et al.*, 1998; Baker, 2000).

Research context and method

Participants and procedure

This study began through a campus-wide project to train faculty in engaging teaching methods. Faculty applied to become 'fellows' and were then part of several on-campus sessions to enhance their teaching. The 'fellows' were included in pedagogical luncheons and training workshops funded by a grant. Each pedagogical luncheon featured a 'fellow' sharing their success story for other instructors to learn from. Each training workshop featured an accomplished writer, researcher and educator brought to the institution to train the 'fellows' on engaged teaching methods. The goal of the grant was to equip instructors with the knowledge and confidence to implement engaged teaching methods into their courses.

Twenty-eight faculty members applied to participate in the grant and were awarded fellowships in spring 2000. They received in-house training during the summer and winter semester breaks. In addition to participating in the on-campus workshops, six fellows travelled to a week-long summer training session in which they furthered their understanding of engaged teaching methods, such as PBL. These six fellows shared their experiences with the rest of the groups at monthly meetings.

Forty-two additional faculty members applied to become fellows in spring 2001. These new members were just beginning the training process when data were being collected for this study; however, they were requested to participate in order to demonstrate a diversity of classrooms and levels of PBL. About 50 of the 70 fellows participated in this study on a voluntary basis.

In exchange for the knowledge gained, fellows administered surveys to their classes to measure levels of student engagement (see Appendix 1). The surveys were administered at the end of the semester for each class. The surveys were then given to the researchers for data analysis. The results reported in this paper are taken from the spring semester 2001. Fifty-six classrooms took the survey, with 2603 total enrolled students and 1831 completed surveys.

Survey instrument

The *Survey of student engagement* was developed using the National Survey of Student Engagement (2000). Key questions were selected based on their measurability of student engagement at the classroom level with relation to level of collaborative learning, cognitive development and personal skills development. Only 14 questions were chosen in order to create a modest survey that was appropriate for quick distribution in a variety of different courses (see Appendix 1).

Results

Reliability

The instrument used to test levels of engagement, the relationships between these levels and test variable, and the highest predictor of classroom engagement was highly reliable. Reliability for the *Survey of student engagement* was determined by using a statistical analysis program, SPSS. The alpha reliability for the 14-item instrument was 0.84.

Demographics

Demographic characteristics about the sample were used to provide results for the study. Course level was coded using 1 for all 100-level courses, 2 for all 200-level courses, 3 for all 300-level courses, 4 for all 400-level courses and 5 for all classes 500 and above. The mean was 2.8 with a standard deviation of 1.19. Enrolment was based on the number of students enrolled in each class that took the survey. Class size ranged from 6 to 150. The mean enrolment was 62, with a standard deviation of 37.6.

The PBL level was determined according to the amount of PBL each instructor reported implementing in their course. Each instructor self-reported how much PBL they perceived to have used. Instructor responses were collected by the researchers and numbers were assigned based on level: 1 was given to each course that reported a very small amount or no PBL, 2 was given to each course that reported a medium level of PBL, 3 was given to each course that reported a high level of PBL and 4 was given to each course that reported very high or exclusive amounts of PBL. The mean PBL level was 2.3, with a standard deviation of 1.1.

Academic college was also obtained to demonstrate the distribution of engagement score (ES) across disciplines. The colleges were coded as follows: 1, Agriculture; 2, Arts, Humanities and Social Sciences; 3, Business Administration; 4, Engineering and Architecture; 5, Human Development and Education; 6, Pharmacy; and 7, Science and Mathematics. The mean was 4 and the mode was 7. The standard deviation was 2.1.

ES was obtained by summing the 14 responses on the survey (with question 5 recoded). Only completed surveys were included, which totalled 1799 of the 1831. The mean ES was 37, with a standard deviation of 7.3. The range of ES was 15 to 56.

Table 1 provides descriptive statistics concerning demographic characteristics about the sample:

1. Course level;
2. Enrolment;
3. Level of PBL;
4. Academic college;
5. Engagement score.

Table 1. Descriptive statistics of variables

	N	Mean	Standard deviation	Range
Course level	1831	2.8	1.19	1, 5
Enrolment	1831	62.00	37.6	6, 150
PBL level	1831	2.3	1.1	1, 4
College	1831	4.0	2.1	1, 7
Engagement score	1799	37.00	7.3	15, 56

Engagement levels

By totalling the scores from questions 1 through 4, a cooperative learning variable was created. The scores ranged from 4 to 16, with a mean of 9 and a standard deviation of 2.7. The cognitive-level variable was created by combining questions 5 through 9. It is noted that question 5, which is a question about the amount of memorization of class material, was recoded (1 became 4, 2 became 3, 3 became 2 and 4 became 1). Memorization of material would not increase classroom engagement and was reversed to provide an accurate ES when statistical tests were run. The scores for cognitive level ranged from 5 to 20. The mean was 14 and the standard deviation was 2.8. The final variable, personal skills, was created by combining questions 10 through 14. These responses ranged from 5 to 20, with a mean of 13 and a standard deviation of 3.4.

Table 2 reports the responses to the three groupings of variables, along with the results of the ES:

1. Cooperative learning;
2. Cognitive level;
3. Personal skills;
4. Engagement score.

Table 2. Responses to engagement: mean responses, by grouped variable, comparison with other grouped variables

	N	Mean	Standard Deviation	df
Cooperative Learning	1823	9.00	2.7	1822
Cognitive Level	1823	14.08	2.8	1822
Personal Skills	1814	13.46	3.4	1813
Engagement Score	1799	37.00	7.3	1798

Note: Comparison variables: Very often or very much = 4, Often or quite a bit = 3, Occasionally and some = 2, Never and very little = 1.

Table 3. Results of the National Survey of Students Engagement (2002), by mean for grouped variables.

	Local institution			Doctoral levels I & II			National		
	First year	Senior	Total	First year	Senior	Total	First year	Senior	Total
Number of students	208	238	446	2889	3027	5916	30635	32193	62828
Cooperative learning	8.77	10.11	9.49	9.09	9.88	9.50	9.24	10.13	9.70
Cognitive level	11.90	13.20	12.60	12.93	13.82	13.38	13.06	14.05	13.56
Personal skills	13.33	15.38	14.43	13.90	15.37	14.66	14.17	15.64	14.93
Engagement score	34.01	38.70	36.51	35.92	39.08	37.54	36.47	39.82	38.19

Comparison with National Survey of Student Engagement

Results of this survey were compared to those of the National Survey of Student Engagement (NSSE) from 2000, which was administered to over 62 000 students. The NSSE had an average ES of 38 (see Table 3). The institution where this study was administered had an ES of 37 on the NSSE from 2000. In the study conducted for this paper, the 56 classes that were examined had an average ES of 37. For classes with higher levels of PBL, the average ES was equal to or higher than the national average. Courses with a PBL level of 3 had a mean of 38, and courses with a PBL level of 4 had a mean of 41.

Table 3 reports the means from the NSSE national study from 2000. Means are reported for each grouped variable (cooperative learning, cognitive level and personal skills) for the institution where this study was conducted, for doctoral levels I and II institutions nationally, and for undergraduates nationally. Each institutional focus is divided into three groups including first-year students, seniors and the first-year students and seniors. Additionally, the number for each group and the mean ES is also listed.

Correlations between demographic characteristics and categories of engagement

The ES was correlated to class level (freshman to graduate), class size, level of PBL, and academic college. Hypotheses 1–3 were all supported. Using a plot, in Figure 1 the correlation of ES as a function of class level is illustrated. The correlation between these two variables was +0.40 ($p<0.000$), indicating that as class level increases, ES also increases.

Figure 2 plots the correlation of ES as a function of class size. As class size decreases, engagement levels increase (–0.52 correlation, $p<0.000$). Notably, close

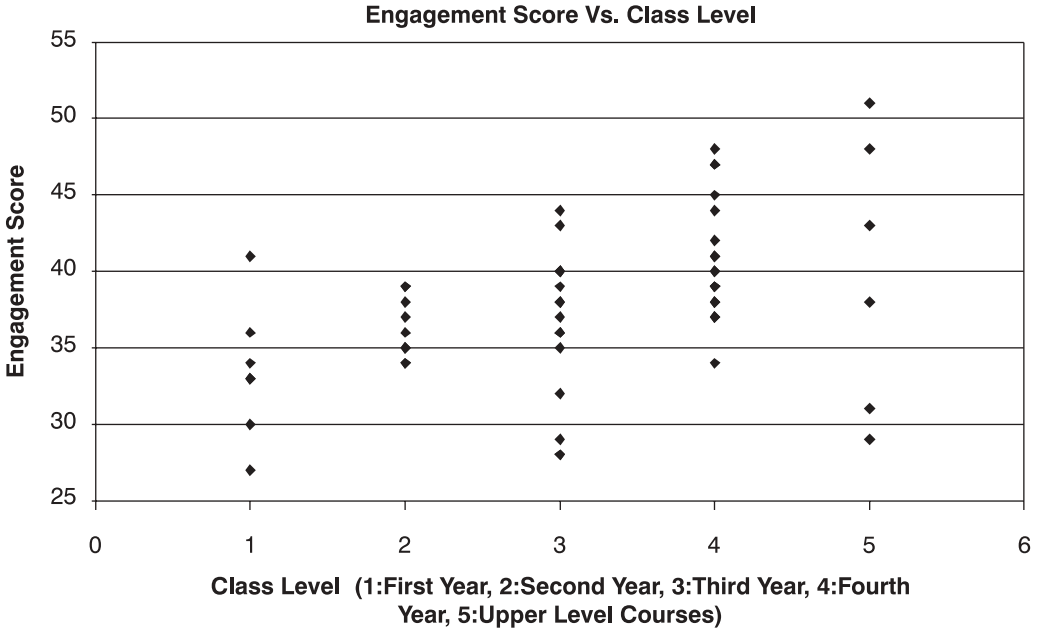

Figure 1. As level of course content increases, engagement increases

examination of Figure 2 reveals levels of engagement that are equal to or higher in the largest class size than that of the smallest class size. For example, a class size of 150 had an ES of 36, while a class size of eight had an ES of 31. In other words, high levels

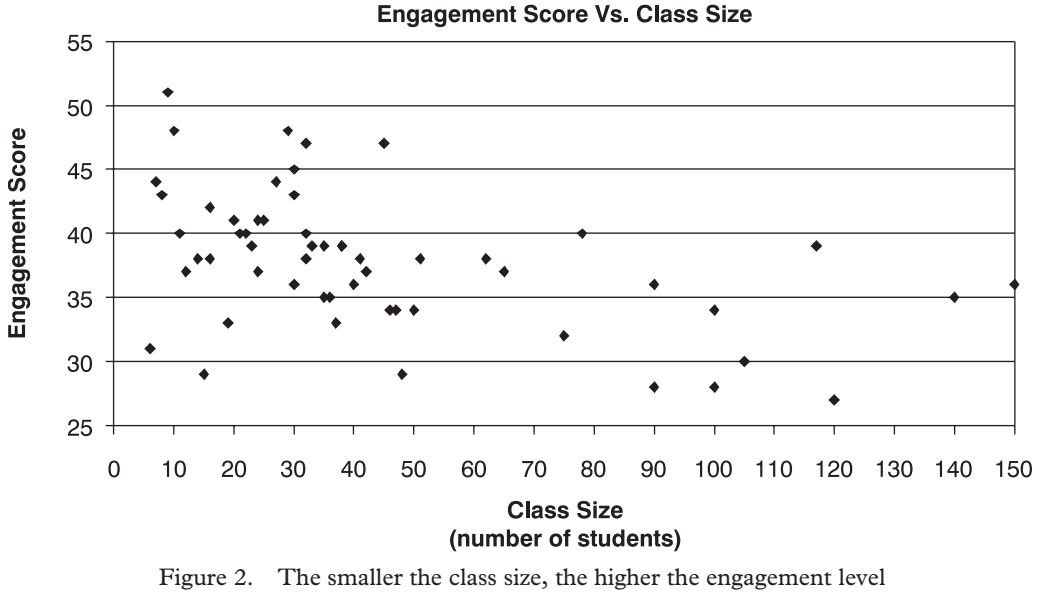

Figure 2. The smaller the class size, the higher the engagement level

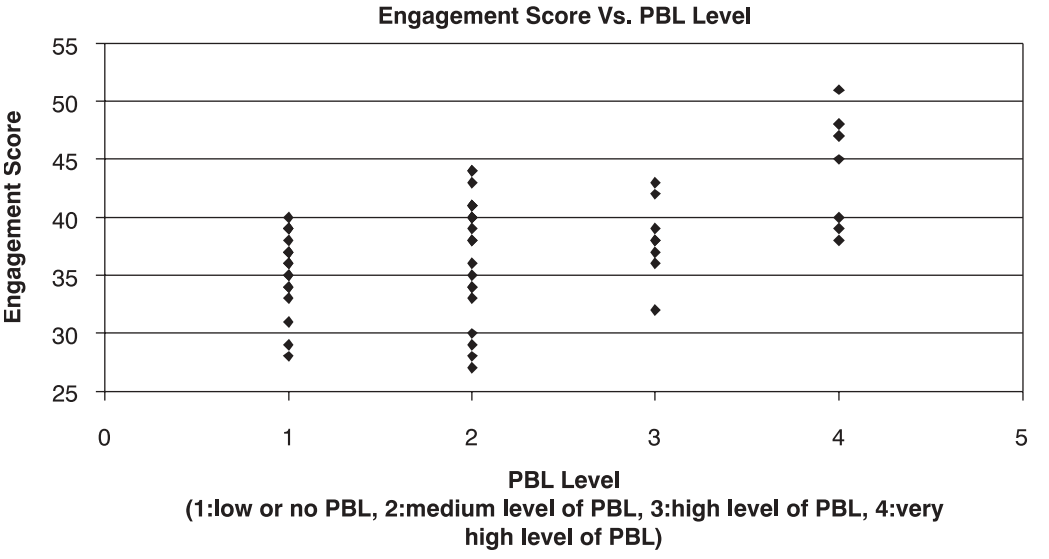

Figure 3. As level of problem-based learning increases, engagement increases

of engagement can be achieved in larger classes, but statistically, it is more likely that they will be achieved in smaller classes.

In addition, Figure 3 reveals that the ES was higher in those classrooms where more PBL methods were used (+0.57 correlation, $p<0.000$).

Finally, Figure 4 plots the distribution of ESs for each college at the university. The college of Arts, Humanities and Social Sciences had the highest score and the college of Science and Mathematics had the lowest score.

Correlations between categories

As mentioned earlier, the instrument consisted of three blocks of measure. The first block was used to measure level of collaborative learning, the second block tested levels of cognitive complexity and the third block tested gains in personal skills. All three categories were positively correlated with one another. Cognitive development and collaborative learning (blocks B and A) had a +0.42 correlation. Personal skills and collaborative learning (blocks C and A) had a correlation of +0.51. Finally, personal skills and cognitive development (blocks C and B) had a +0.58 correlation. These correlations reveal a strong interdependence among the groupings and all were statistically significant ($p<0.000$).

Prediction of engagement

Regression analysis was run for each variable, course level, enrolment, PBL level and academic college/area of study to find which variables are most predictive of ES.

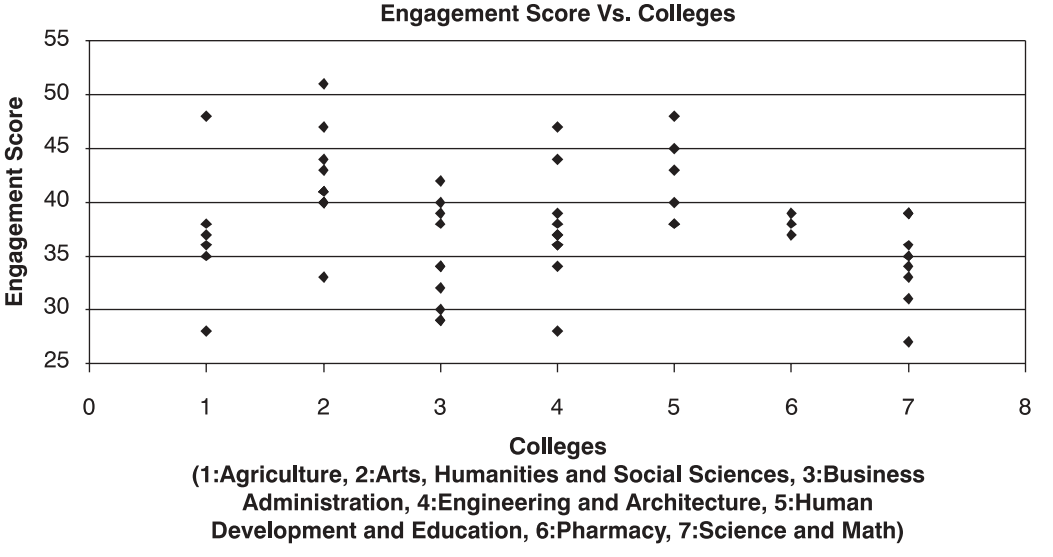

Figure 4. Distribution of engagement scores, by college

Course level, enrolment, PBL level and academic college were all statistically significant. Table 4 illustrates the full regression model with all four variables.

Discussion

The results of this study reveal important information about engaged teaching practices. Not only does this paper demonstrate the effectiveness of these methods, but it also establishes credibility for engaged teaching practices. A simple instrument was developed to measure student engagement at a class level. The survey instrument was designed to explore three characteristics about the students. The total ES was based on three groupings of questions designed to learn more about levels of cooperative learning, levels of cognitive challenge, and the development of personal skills. The sum of these three groupings of questions was what gave the ES for each student. In testing these variables with one another, it was revealed that they are all

Table 4. Full regression model

Predictors	Beta	Significance
Course level	0.088	0.001
Enrolment	–0.317	0.000
PBL	0.335	0.000
Academic college	0.083	0.000

Note: Std. error of the estimate = 6.42, adjusted R^2 = 0.221, $F(4, 1794)$ = 128.88, $p<0.000$.

highly correlated and statistically significant. Therefore, the instrument was of solid structure and an appropriate measure for our study. Additionally, each of these three variables are highly interdependent and necessary variables for researching ES. The averages of ES for the three sections of the survey and the total ES are provided for this study, as well as for the similar NSSE study. The instrument and the averages can be used by other instructors to measure and compare engagement levels in their classes.

Comparing our study to the national study further served to reinforce the reliability of our results and the credibility of the institution. The institution where this study was conducted had comparable means with the national results (national $\mu = 38$, and local institution $\mu = 37$) from the NSSE in 2000. Notably, the results of the data for this paper show higher ES than the national results from 2000 in those classes that used a high level of PBL (national $\mu = 38$, level 4 $\mu = 41$). Exploration as to why various institutions are higher than others would be important for future research.

This study suggests that higher levels of engagement can be achieved in smaller-sized, upper-level classes and, most importantly, by implementing PBL methods of instruction (see Figures 1–3). Class level, enrolment, and level of PBL were all highly correlated with the ES. As predicted, higher-level classes had higher levels of engagement, classes with a smaller enrolment had higher levels of engagement and those classes with more PBL also had higher levels of engagement.

Clearly, upper-division classes tend to be smaller and faculty tend to use more engaged teaching methods in these courses. The results of this study demonstrate this logical pattern. However, all students deserve this same level of engagement in all their classes, regardless of level or size. Because of many factors, including staffing and classroom space, large classes may always be a part of college education. This does not mean, however, that instructors cannot work to implement engaged teaching into all courses including introductory lecture halls.

It is important to provide opportunities for students at all levels and in all class sizes to experience engaged instruction. It may be more likely for engaged methods to be used in upper-level classes that are smaller in size, but they can be used in any classroom.

Also discovered was the college with the highest level of engagement. The college of Arts, Humanities and Social Sciences is a naturally 'expressive' area of study, which is highly conducive to this type of learning. It is logical that this college would score higher than a less communication-based college. It was also found that the level of engagement depends on the college or subject. It is more challenging to achieve higher levels of engagement in mathematics and science classes as compared to arts and humanities classes. A possible reason for the lower engagement levels in these classes may be because the traditional instructional methods used in these classes are less engaging. Again, the level of PBL can help in this regard. For example, when PBL was used in a large (117 students), introductory physics course, the total ES average for the class was 39, which is higher than the overall mean for this study. Here, it is demonstrated how PBL success can surpass

limitations that typically hinder engagement. Overall, this study demonstrated that course level, enrolment, levels of PBL and academic college were all good predictors of ES.

Further research should examine engagement levels longitudinally. Research could explore the relevance of time for increasing ES. It would be important to know how students' feelings about PBL affected the results. It would also be important to examine teacher effectiveness. Depending on how long teachers have been using PBL, the students will respond differently. Also, some teachers are naturally effective at using alternative teaching styles, while others are less successful.

Research should also be done to study the relationship between ES and conceptual understanding of subject-matter on a standardized exam. As Hake (2002) points out, it is necessary to develop good standardized conceptual tests in all subject areas. However, developing such tests is a difficult and time-consuming task. Until such tests are developed, instruments like the one developed in this study may prove useful in measuring student understanding and perceived success for future courses and life beyond the university.

PBL can be an effective method for increasing classroom engagement (Duch *et al.*, 2001). Involving students at a higher, more sophisticated level is something that all instructors should work to achieve in all classes, not just in higher-level courses with fewer students. This study demonstrates the pattern of higher engagement occurring more frequently in upper level, smaller classes. It also supports the argument that instructors should be engaging students at high levels in all class sizes and class levels. A better education and more sophisticated skill development can be the result of such attempts to enhance the classroom experience.

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Appendix 1. Student engagement survey

A Survey of Student Engagement

Course Number:_____ **Instructor:**_____

Please cross (X) your answers.

A. During your class, about how often have you done each of the following?
Scale: 4: very often; 3: often; 2: occasionally; 1:never

1. **Asked questions** during class or contributed to class discussions	4	3	2	1
2. **Worked with other students** on projects during class time	4	3	2	1
3. **Worked with classmates outside** of class to complete class assignments	4	3	2	1
4. **Tutored or taught** the class materials to other students in the class	4	3	2	1

B. To what extent has this course emphasized the mental activities listed below?
Scale: 4: very much; 3: quite a bit; 2: some; 1: very little

5. **Memorizing** facts, ideas or methods from your course and readings so you can repeat them in almost the same form	4	3	2	1
6. **Analyzing** the basic elements of an idea, experience or theory such as examining a specific case or situation in depth and considering its components	4	3	2	1
7. **Synthesizing and organizing** ideas, information, or experiences into new, more complicated interpretations and relationships	4	3	2	1
8. **Evaluating** the value of information, arguments, or methods such as examining how others gathered and interpreted data and assessing and accuracy of their conclusions	4	3	2	1
9. **Applying** theories and/or concepts to practical problems or in new situations	4	3	2	1

C. To what extent has this course contributed to your knowledge, skills, and personal development in the following ways?
Scale: 4: very much; 3: quite a bit; 2: some; 1: very little

10. **Acquiring job or career related** knowledge and skills	4	3	2	1
11. **Writing** clearly, accurately, and effectively	4	3	2	1
12. **Thinking** critically and/or analytically	4	3	2	1
13. **Learning effectively on your own**, so you can identify, research, and complete a given task	4	3	2	1
14. **Working effectively with other individuals**	4	3	2	1