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Learning Outcomes of Introductory Engineering Courses: Student Perceptions

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LEARNING OUTCOMES OF INTRODUCTORY ENGINEERING COURSES: STUDENT PERCEPTIONS

Abstract

This paper evaluates the learning outcomes of an introductory level engineering course and compares the assessment data of these outcomes to student self-evaluation of the achievement of outcomes. The introductory course is designed to contribute toward the achievement of four ABET[1] student outcomes. Assessment of outcomes is performed through direct measurements of student performance in multiple assignments and three team projects. The data from the direct assessment is compared with the student perceptions of the achievement of these outcomes. Statistical analysis and correlation analysis are used to compare the two data sets. Student perceptions are quantified through data collected from surveys conducted in three sections of the course taught by two different instructors during Fall 2013 with the use of a 1-5 Likert scale. The surveys are conducted at the end of the semester. The surveys are designed such that each outcome can be mapped to multiple questions in order to avoid possible inconsistencies in student responses, and in order to build some redundancies in the survey instrument. Comparison of the two data sets yields important information about the achievement of learning outcomes (called student outcomes in the ABET[1] literature) from a student's perspective. The student surveys are also used to quantitatively and subjectively evaluate the student response toward the project-based learning (PBL) model that has been integrated in this course, as well as student responses to other aspects of PBL such as teamwork, open-ended problem solving, etc. The analysis of the learning outcomes and student self-assessment provides useful feedback about the course content of a required introductory course for engineering freshmen. This feedback can be used to improve curriculum and enhance student engagement. Students are known to find the transition from high school to a demanding major such as engineering very challenging. This study provides some insight into the student opinion about this transition. Furthermore, the findings from this study can be used to improve the delivery of follow-up introductory courses and enhancement of metacognitive development. The assessment of learning outcomes through multiple measures provides a means of understanding the usefulness of laboratory and project content in meeting outcomes, and also allows a comparison of the findings with the data in the existing literature.[2, 3]

Keywords: Introductory Courses, Learning Outcomes, Project-based Learning (PBL).

1. Introduction

The role of introductory courses in engineering is commonly acknowledged to be extremely important for student engagement as well as retention.[4] The introductory courses in engineering generally serve the purpose of raising student awareness about engineering careers and the engineering curriculum while trying to excite and motivate them by using hands-on activities, projects, etc. The core learning objectives of the introductory courses involve activities that entail application and understanding rather than higher level cognitive outcomes involving design and analysis. An additional purpose of these learning objectives for an introductory course is to help enrolled students in determining whether an engineering education would be a suitable match for their background and interest. The integration of hands-on projects into the introductory engineering courses is generally considered to be helpful for retention as well as motivation.[4] Since the learning objectives and the student outcomes associated with the introductory courses can be widespread, it is important to critically assess the achievement of these outcomes.

Project-based learning (PBL) is recognized as a high-impact practice that enhances student learning and strongly motivates students.[5,6] PBL allows students to learn through practice, with open-ended projects and assignments that could have multiple solutions. In some of the tasks associated with the projects, the instructor becomes a facilitator and is not necessarily a content expert. This approach makes application of the concepts learnt in the class more important than a mere repetition of the content in an assignment. PBL also allows incorporation of oral and written communication components into the course through required presentations, project reports, team meetings and interactions. The application and hands-on components of PBL are especially crucial in an applied science program such as engineering.

Student perceptions about engineering and engineering curriculum can vary significantly depending on the exposure that freshmen students may have had prior to starting an undergraduate engineering program. While there are traditional means of direct assessment that can be used to measure the achievement of specific learning outcomes of the introductory courses, it is important to comprehend student perceptions about the achievement of these outcomes. It is useful to know whether the students themselves believe that the established outcomes are being achieved or not, and to see the correlation, if any, between student perceptions and the assessment data. Using the direct means of measurement is a robust method for quantifying the degree of achievement of a specific learning outcome, but getting a student perspective about the achievement of outcomes can provide valuable information that can be used to improve course content or change the means of delivery of the course content to suit student needs. This is particularly important for an introductory level course in an engineering program since the retention rates are known to be particularly low during the first two years of the program.[7] Furthermore, student perceptions also allow instructors to evaluate whether freshmen students are attaining oral and communication skills, team work skills, etc. that are important program outcomes for engineering graduates.[1,8]

2. Course Content and Learning Outcomes

The course content for the introductory level course discussed in this paper has been selected so as to provide the enrolled students with a background of engineering design cycle and introduce the students to different engineering disciplines. Students also get introduced to basic electrical circuits, preliminary concepts in statics such as centroids, area moment of inertia, and engineering analysis tools such as PSpice, MS Excel and MATLAB®. The course content includes three projects with varying levels of complexity. Students work on the projects in teams of three, with the first two projects scheduled for four weeks each. The third project is introduced in the fourth week of the semester and students are expected to work on this project till the end of the semester. The deliverables for the three projects vary with the project demonstration component being the main deliverable in the first two projects but the design method and design presentation being the main deliverables in the third project. Written and oral communication components are intertwined with all three project deliverables through required status reports, project reports and oral project presentations. The course is worth three credit hours with the contact time distributed into two separate hundred minute sessions per week. Typically, one of the two sessions every week (except for the first three weeks) is used for project activities. The outline of the course content is shown in Table 1.

Table 1. Course content for Introduction to Engineering.

Week 1	Engineering disciplines, engineering roles, industry expectations, academic path	
Week 2	Engineering design and development, team work, communication skills	
Week 3	Basic electrical circuits	
Week 4	Basic electrical circuits	Project 1
Week 5	Electrical circuit simulation software – PSpice	
Week 6	Units and dimensions	
Week 7	Center of gravity and centroid	
Week 8	Centroid and composite areas	Project 2
Week 9	Moment of inertia of areas	
Week 10	Moment of inertia of areas	
Week 11	Deflection of beams in bending	
Week 12	Engineering analysis tools – MS EXCEL	Project 3
Week 13	Engineering analysis tools – MS EXCEL	
Week 14	Engineering analysis tools – MATLAB	

It may be noted that although Project 3 is shown in Table 1 as a three week activity, this project is introduced early in the semester and is intentionally designed to be very vague, requiring students to develop a mission statement, project deliverables, target specifications, etc. This introductory course in the freshmen year is a precursor to a chain of PBL courses that the engineering students are required to take till the graduating year. This sequence of courses consists of one three credit course in each year of study. This sequence of courses is expected to inculcate skills in engineering design and development, use of analysis tools, development of professional and communication skills, understanding of professional behavior, business ethics, commercial constraints, project management, team work skills, etc. Teaching these skills is very challenging in other engineering classes that are generally focused on delivering a lot of content. Having a chain of PBL courses allows the integration of the content learnt in other courses into projects and hands-on activities at different levels during the four years of engineering curriculum.

The learning outcomes identified for the introductory course discussed in this paper are as follows:

1. Students develop an ability to function on multidisciplinary teams;
2. Students develop an ability to identify, formulate, and solve engineering problems;
3. Students develop an ability to communicate effectively;
4. Students develop a recognition of the need for, and an ability to engage in life-long learning.

These learning outcomes are identical to ABET[1] student outcomes: ‘d’, ‘e’, ‘g’ and ‘i’ respectively.

All three projects required for this course are completed in teams of three students per group. Each group is required to provide written status reports and final project reports for two of the three projects. Project teams are also required to make two oral presentations to the rest of the class for Project 2 and Project 3. The scope of the three projects is designed in such a way that the first project has specific targets and a well-defined approach to achieve the project objectives. The second project is open-ended with multiple possible solutions, and the third project is not well defined with the students required to investigate the project background in order to come up with possible solutions. The assessment map used for directly measuring and quantifying the achievement of each learning outcome is shown in Table 2.

Table 2. Outcomes – Mapped to assignments and projects.

Learning Outcome	Assignment/Project
Students develop an ability to function on multidisciplinary teams	Projects 1, 2 (project demonstrations)
Students develop an ability to identify, formulate, and solve engineering problems	Assignments 5 & 6
Students develop an ability to communicate effectively	Projects 2, 3 (reports & presentations)
Students develop a recognition of the need for, and an ability to engage in life-long learning	Assignment 2 & Project 3 (report)

Student grades from the assignments and projects listed in Table 2 are used for direct measurement of the achievement of learning outcomes. A performance indicator is developed to calculate the percentage of students achieving grades higher than the statistical average for a specific learning outcome from the aggregate of respective assignments and projects. If the calculated percentage of students (i.e. performance indicator) is 75 or above, the learning outcome is deemed to have been successfully achieved. As an assessment policy, an investigation is required if the performance indicator is below 75% for two successive semesters. This is based on an elaborate rubric that has been incorporated in the accreditation self-study documents for the relevant programs. It may be noted that the results of the analysis may change if a different performance indicator is used. However, the trends are expected to be similar even with a different performance indicator. In this study, these results from the direct assessment are compared with the self-assessment done by the students, as evaluated from the survey results that will be discussed in the subsequent section. The next section presents the results from data collection as well as direct assessment.

3. Data Collection and Assessment Results

This section discusses the results from the assessment of learning outcomes performed for the introductory engineering course discussed in the previous section. A direct assessment of each learning outcome is performed by using student performance data from specific assignments and projects (refer to Table 2). An alternative evaluation is performed by using the data collected from a survey completed by the students enrolled in the introductory class. A preliminary analysis is performed to compare the two measurements, and is discussed in this section.

The data collection was performed in three sections of the course taught by two different instructors during Fall 2013. The data collection was conducted two times, first during the eighth week of classes and then during the fourteenth week of classes. The first round of data collection was conducted to perform a pilot study and to detect any possible problems or ambiguity with the survey questionnaire. As a result, this data has not been used for analysis. All the data presented in this paper is based on the second round of data collection, when all the course content was delivered and most of the project activities were completed. Participation in the survey used for data collection was voluntary and participating students were required to sign an informed consent form that was approved by the Institutional Review Board (IRB) of the university. Student information such as name, identification, etc. was not collected and there was no direct or indirect means of tracking survey responses to specific students. A request for exemption for Human Subjects Research was submitted to the IRB at the university, and an approval was obtained earlier during the semester after completing the required training. The survey questionnaire was designed such that each question in the survey can be directly mapped to a specific learning outcome for the course. Some redundancy was built into the questionnaire to enhance the robustness of the measurements from the survey. The survey was completed by participating students by checking one of the five possible responses to each question. The survey was only conducted in the print format and participating students were given a five minute background about the study. Students were asked to respond to the following (twenty questions) in the questionnaire:

1. Working in project teams for ENGR 199 has improved my ability to participate in group work.
2. I believe that diversity of skills strengthens a project team.
3. Skills learned in ENGR 199 will allow me to identify engineering problems.
4. Projects and assignments for ENGR 199 have improved my written communication skills.
5. Project work in ENGR 199 has helped me in understanding the importance of learning about new things.
6. Skills learned in ENGR 199 will be important in engineering curriculum.
7. Working in project teams for ENGR 199 has allowed me to understand that there can be different ways of solving a problem.
8. I understand that development of skills for continuous learning is extremely important.
9. Project work in ENGR 199 has improved my oral communication skills.
10. I believe that developing strong communication skills is necessary to be successful in an engineering career.
11. Project work in ENGR 199 has improved my ability to communicate with my project team.
12. I believe that identification and formulation of problems is a crucial step toward solving engineering problems.
13. I believe that teamwork is extremely essential in engineering projects.
14. I think that an engineering project team becomes weaker if it consists of members with different skills.
15. I recognize that engaging in life-long learning is important in an engineering career.

16. Project work in ENGR 199 has improved my overall professional skills.
17. Feedback from team members has enhanced my ability to assimilate ideas.
18. I know more about engineering than I did at the beginning of the semester.
19. Topics covered in ENGR 199 have taught me to go through a step-by-step approach for solving engineering problems.
20. I believe that continuously learning about new techniques, technologies and tools is important in an engineering career.

All the survey responses are quantified using a 1-5 Likert scale, with 1 representing a very high level of agreement with the survey question and 5 representing a very high level of disagreement with the survey question. The 1-5 scale allows a quantitative analysis of the data in addition to a general subjective analysis of the responses obtained from the survey questionnaire. This 1-5 scale will be used throughout this section for analyzing the results from the survey. A total of 66 students participated in the final survey, all the participants were freshmen and have declared an engineering or an engineering technology program as their major area of study. All the data collected from the survey is presented in the Appendix for reference.

The mapping between learning outcomes and survey questions is shown in Table 3. The mapping is done such that student perception about each outcome is based on responses to four to five questions in the survey.

Table 3. Outcomes – Mapped to Survey Questions.

Learning Outcome	**Survey Question #**
Students develop an ability to function on multidisciplinary teams	1, 2, 13, 14, 17
Students develop an ability to identify, formulate, and solve engineering problems	3, 6, 7, 12, 19
Students develop an ability to communicate effectively	4, 9, 10, 11, 16
Students develop a recognition of the need for, and an ability to engage in life-long learning	5, 8, 15, 20

Student perception about the achievement of each outcome is based on the aggregate from the respective survey questions in Table 3. The mapping outlined in Table 3 allows a quantification of the survey results that can be statistically analyzed. It may be noted that survey question number 18 is not mapped to any specific outcome but is instead used to subjectively evaluate student perceptions about their understanding of engineering as a result of the introductory course.

As can be seen from the list of survey questionnaire, related questions have been asked multiple times in order to strengthen the validity of the findings. All the questions are kept pretty short to avoid any ambiguity, and so as to allow the completion of the survey in 10 to 15 minutes. Most of the students participating in the survey completed the questionnaire within 10 minutes.

Some of the responses to the survey questions are shown in Fig. 1 to Fig. 4. Specific questions have been selected to showcase the responses to at least one question from each learning outcome. It can be seen that the percentage of respondents strongly agreeing (Likert scale 1) or agreeing (Likert scale 2) is more than 90 with the exception of the response to Question # 4 in Fig. 1. This corresponds to outcome III that was not deemed as being successfully achieved by a sizeable number of the respondents (with 27% of the students disagreeing). This can also be observed from the aggregate results that are discussed in this section.

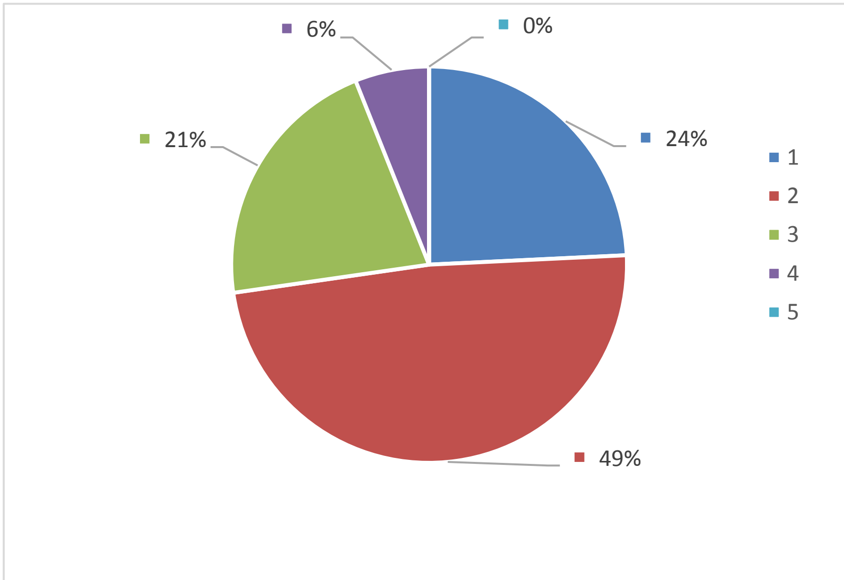

Fig. 1. Survey Response – Question # 4.

Fig. 2 shows that 97% either strongly agree (Likert scale 1) or agree (Likert scale 2) with recognizing the possibility of multiple solutions to an engineering problem (Question # 7).

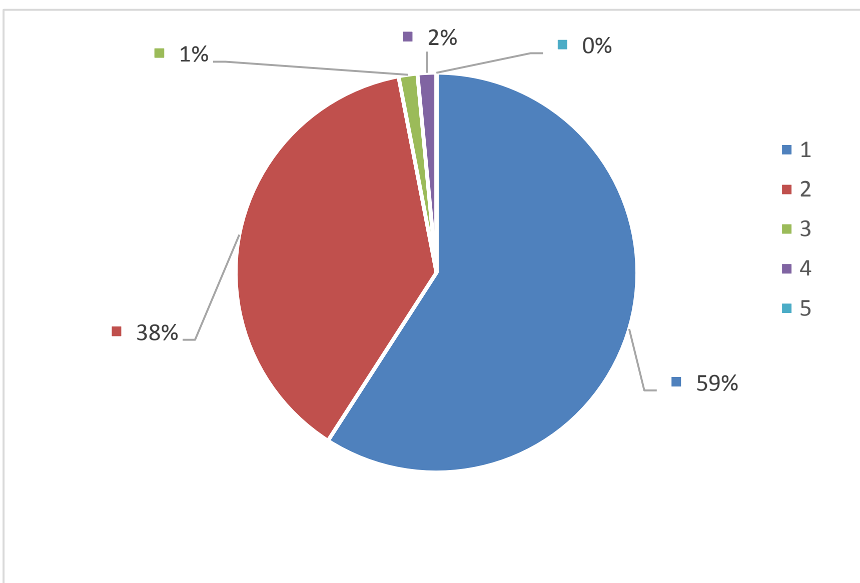

Fig. 2. Survey Response – Question # 7.

Fig. 3 demonstrates strong agreement (Likert scale 1) or agreement (Likert scale 2) with the recognition of the importance of continuous learning (Question # 8), with 94% of the students agreeing or agreeing strongly.

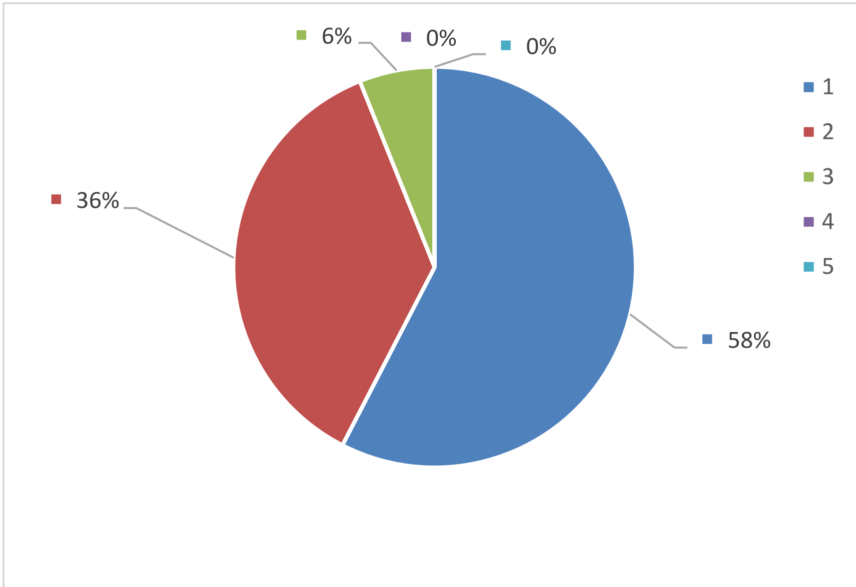

Fig. 3. Survey Response – Question # 8.

The importance of teamwork in engineering projects is acknowledged by 98% of the students, as can be seen from Fig. 4, with 68% strongly agreeing and 30% agreeing to Question # 13.

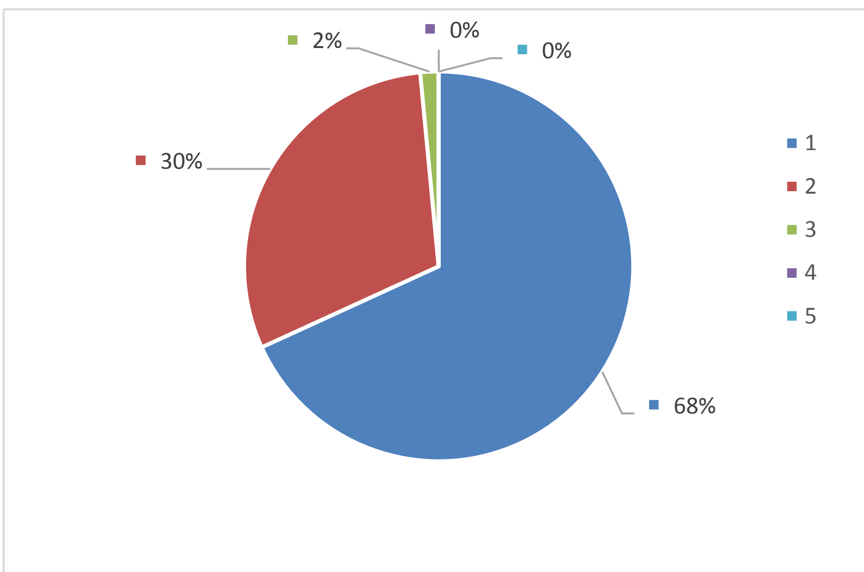

Fig. 4. Survey Response – Question # 13.

The aggregate results from the questionnaire for each outcome are listed in Table 4 using three commonly used statistical measures. As can be seen from the results in Table 4, student responses reveal that more than 50% of the students participating in the survey are either in agreement or in strong agreement about the achievement of the learning outcomes. However, the variability of the responses is relatively high for outcome I and outcome III, as indicated by the high coefficient of variation (COV) in Table 4. It may be noted that the scale of measurement is established such that a score of 1 indicates strong agreement and a score of 5 indicates strong disagreement with the achievement of the learning outcomes.

Table 4. Learning Outcomes – Survey Results.

	Mean	Standard Deviation	Median	COV
Learning Outcome I (multidisciplinary teams)	1.48	0.24	1.48	0.16
Learning Outcome II (formulating and solving problems)	1.51	0.11	1.53	0.07
Learning Outcome III (effective communication)	1.70	0.32	1.72	0.19
Learning Outcome IV (life-long learning)	1.53	0.12	1.52	0.08

The learning outcome associated with communication skills is found to be particularly concerning since a significant number of respondents feel that they did not acquire or improve their written and oral communication skills (refer to Fig. 4). This will be discussed further after presenting the results from the direct assessment of all the outcomes. Fig. 5 shows the response to Question # 18. It may be noted that this question is not mapped to any outcome but subjectively evaluates the overall student perception about obtaining an understanding of engineering careers and curriculum as a result of the introductory course. As can be seen from Fig. 5, 91% of the respondents feel that they have a better understanding of engineering at the end of the semester. This can be discerned from the strong agreement (Likert scale 1) or agreement (Likert scale 2) expressed by the respondents to Question # 18.

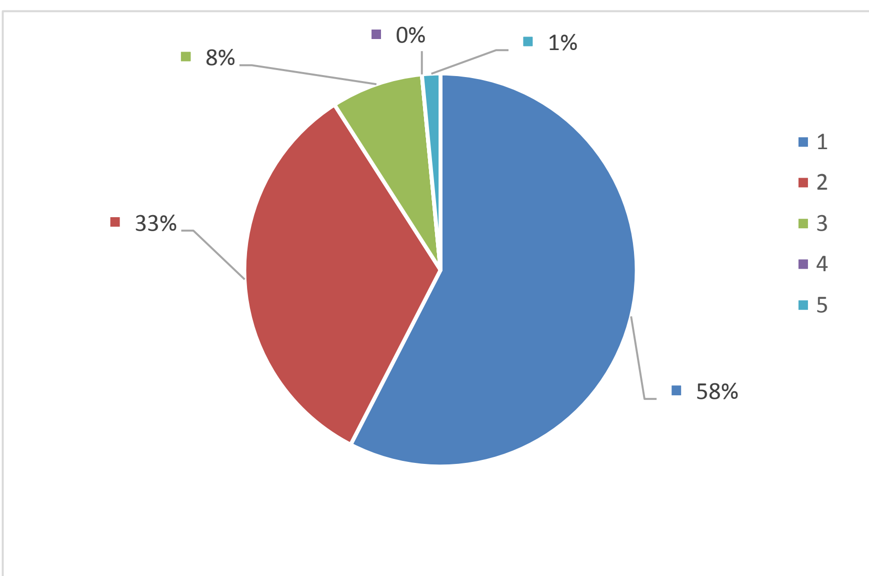

Fig. 5. Survey Response – Question # 18.

The results from the direct assessment as per the mapping in Table 2 are shown in Table 5 for all four learning outcomes that are being investigated in this study. It may be noted that these results aggregate the data for the entire group of students registered in the course and may include data from students who did not participate in the survey. Since more than 60% of the enrolled students participated in the survey from each section, the survey results are expected to represent the entire group of students enrolled in this course. The performance indicator, listed in Table 5, is the percentage of students scoring more than the established metrics in the rubric for the aggregate projects and assignments used to evaluate each learning outcome, listed in Table 2. As can be seen from the results in Table 5, the indicator for outcome I is the highest whereas the indicator for outcome III is the lowest. This seems to corroborate the self-assessment reported by the survey respondents for this learning outcome pertaining to written and oral communication.

Table 5. Learning Outcomes – Direct Assessment.

	Performance Indicator (%)
Learning Outcome I (multidisciplinary teams)	80
Learning Outcome II (formulating and solving problems)	73
Learning Outcome III (effective communication)	63
Learning Outcome IV (life-long learning)	80

Fig. 6 plots the performance indicator for each outcome listed in Table 5 versus the mean aggregate response listed in Table 4. There is a direct proportional relationship between the two sets of data points. A decreasing performance indicator connotes a reducing level of achievement of the learning outcome, and the increasing survey response index indicates a dissatisfaction with the achievement of a learning outcome. The analysis performed for this study indicates that self-assessment of students is aligned with the direct measurement of each outcome in terms of a trend line, as shown in Fig. 6. The calculated correlation coefficient between the mean in Table 4 and the performance indicator in Table 5 is 0.902, further strengthening the validity of the relationship between the two data points used to evaluate the achievement of outcomes in this study. Although the correlation coefficient does not establish causality and does not account for variability, it can be safely concluded that there is a direct correlation between student dissatisfaction and the lack of achievement of a specific outcome.

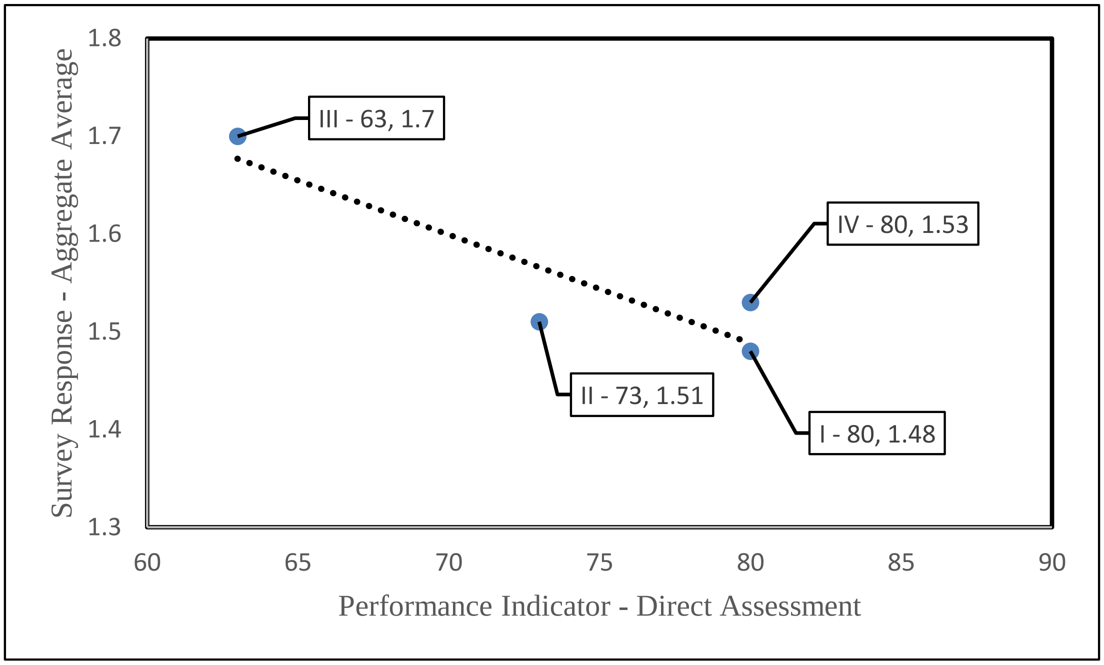

Fig. 6. Comparison – Direct assessment versus self-assessment.

It is important to note that outcome III has a performance indicator of 63 (Table 5), considerably lower than the indicator for all other outcomes, and also well below the established limit of 75. A sample of the student self-assessment for this outcome can be seen in Fig. 1 (for survey question # 4), 27% of the students feel that they did not improve their written communication skills. The aggregate for outcome III in Table 4 yields the highest mean and the highest COV, both indicative of student dissatisfaction with the achievement of this outcome. This could be attributed to the fact that students were only required to write three status reports and two project reports for this course, and that each of these reports was a group activity. It is possible that each group designated one specific member as the report writer. Individual reports on project status as well as reflection essays could be assigned in the future in order to enhance the achievement of this outcome. This needs to be investigated further since improving written communication skills is an important learning outcome of this course that is expected to be strengthened through the PBL course sequence.

4. Discussion and Conclusions

The investigation of learning outcomes in this paper provides an interesting insight into student perceptions about an important introductory course for engineering students. Student self-assessment of each outcome is seen to correlate with the results from direct assessment. Particularly, it is observed that students correctly identify the learning outcome that is not successfully achieved. The learning outcome pertaining to communication skills has not been achieved for the introductory course studied in this paper, as identified by direct assessment of this outcome. Student self-assessment corroborates this finding.

The results from the analysis performed in this paper indicate that student self-assessment can be used as an effective means of comprehending and even (indirectly) assessing learning outcomes. Although the results of this study are preliminary and are limited to a relatively small sample size, the results indicate that self-assessment can be used as a tool to monitor the achievement of critical outcomes. Regular and periodic self-assessment from students might help an instructor to come up with an early intervention plan to reconfigure course content or to change content delivery methods in order to enhance the possibility of achieving critical learning outcomes. This is important since the direct assessment of specific outcomes is typically done at the end of the semester, or during program assessment, which is often too late for students who have already taken courses in which outcomes have not been achieved. Although important and necessary, the formal means of direct assessment do not provide the instructor with an immediate feedback from students about these outcomes. Using simple survey instruments throughout the semester with a simple mapping to learning outcomes might be an important additional data point that an instructor can use during the semester. Conducting self-assessment could also raise awareness among students about the learning outcomes and provide them a larger context for the need of learning specific topics and chapters in their degree program. Some similar initiatives have been discussed in the existing literature to engage students in their education, particularly in the freshmen courses, and to possibly increase retention rates.[9,10] Benefits of self-assessment are also discussed in the existing literature, especially for metacognitive development and for the improvement of learning skills.[11,12] Students often complain that they cannot relate to certain topics or courses in their program of study. Directly informing students about specific objectives and learning outcomes may be a means of overcoming this problem, leading to a higher student engagement in their program of study.

Future work will expand the scope of the study by using data from a sequence of introductory courses as well as advanced courses. A thorough statistical analysis of the influence of different performance indicators on the results will be performed as part of a future study. Reasons behind the similarities and differences between student self-assessment and direct assessment measurements will also be investigated. The differences between the data points could result from varying levels of student cognition or due to student misperceptions about the achievement of outcomes, this needs to be investigated further. A clear understanding of these factors would allow for an investigation into possible means of improving the delivery and content of critical introductory courses, and even other courses in the engineering curriculum. The observations about self-assessment from this study will be compared to results in relevant literature as part of future work.

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Appendix

The data collected from all the respondents who participated in this study is presented in the Appendix in Table A.1 and Table A.2. The combined results are presented in Table A.3. It may be noted that the numbers provided in Table A.1 and Table A.2 correspond to the total number of respondents strongly agreeing (1), or agreeing (2), or neither agreeing/nor disagreeing (3), or disagreeing (4), or strongly disagreeing (5) to specific questions in the survey discussed in Section 3.

Table A.1. Data Collection – Sections 1 & 2.

		Data - Sections 1 & 2 - 49 respondents																											
			Learning Outcome I							Learning Outcome II							Learning Outcome III							Learning Outcome IV					
		Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean
		1	24	22	1	2	0	1.61	3	23	20	5	0	1	1.69	4	11	26	9	3	0	2.08	5	18	27	3	1	0	1.73
		2	33	15	0	0	1	1.39	6	22	25	2	0	0	1.59	9	15	22	10	2	0	1.98	8	27	19	3	0	0	1.51
		13	29	19	1	0	0	1.43	7	27	21	1	0	0	1.47	10	27	20	2	0	0	1.49	15	25	20	3	0	1	1.61
		14	5	6	4	16	18	3.73	12	25	22	1	1	0	1.55	11	22	24	1	1	1	1.67	20	32	16	1	0	0	1.37
		17	13	28	8	0	0	1.90	19	23	22	3	1	0	1.63	16	14	27	8	0	0	1.88							
Sections 1 & 2	μ							1.58							1.59							1.82							1.56
	σ							0.20							0.08							0.21							0.13
	Median							1.52							1.59							1.88							1.56

Table A.2. Data Collection – Section 3.

		Data - Section 3 - 17 respondents																											
			Learning Outcome I							Learning Outcome II							Learning Outcome III							Learning Outcome IV					
		Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean	Q	1	2	3	4	5	Mean
		1	8	9	0	0	0	1.53	3	8	9	0	0	0	1.53	4	5	6	5	1	0	2.12	5	9	7	1	0	0	1.53
		2	13	3	1	0	0	1.29	6	12	5	0	0	0	1.29	9	8	7	2	0	0	1.65	8	11	5	1	0	0	1.41
		13	16	1	0	0	0	1.06	7	12	4	0	1	0	1.41	10	14	3	0	0	0	1.18	15	10	7	0	0	0	1.41
		14	2	3	0	4	8	3.76	12	12	3	2	0	0	1.41	11	14	3	0	0	0	1.18	20	6	11	0	0	0	1.65
		17	7	9	1	0	0	1.65	19	8	9	0	0	0	1.53	16	7	7	3	0	0	1.76							
Section 3	μ							1.38							1.44							1.58							1.50
	σ							0.23							0.09							0.36							0.10
	Median							1.41							1.41							1.65							1.47

Table A.3. Data Collection – Sections 1, 2 & 3.

		Learning Outcome I		Learning Outcome II		Learning Outcome III		Learning Outcome IV	
Sections 1, 2 & 3	μ	Respondents = 66	1.48	Respondents = 66	1.51	Respondents = 66	1.70	Respondents = 66	1.53
	σ	Questions: 1, 2, 13,	0.24	Questions: 3, 6, 7,	0.11	Questions: 4, 9,	0.32	Questions: 5, 8,	0.12
	Median	14, 17	1.48	12, 19	1.53	10, 11, 16	1.72	15, 20	1.52