Engage to Learn: A Correlation Analysis

By

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Literature Review

The link between student engagement and learning outcomes has become a focus of educational research, with engagement recognized as a complex process that involves behavior, cognition, and emotions (Blakey & Major, 2019; Tsai et al., 2021). The importance of engagement in an online learning environment has been recognized, especially in light of the rapid shift towards accelerated and distance learning during the COVID-19 pandemic (Hollister et al., 2022). Studies have demonstrated that students' perceptions of engagement can be significantly shaped by the interactivity of course activities, especially those that facilitate peer and instructor interactions (Tsai et al., 2021; El-Sayad et al., 2021). Guo (2018) highlights that the learning environment, structured to induce academic effort, can influence the development of generic skills, suggesting that deep, integrative learning approaches can result in substantial intellectual benefits. Moreover, the findings of Haug et al. (2019) add an important dimension to the discourse by indicating that engagement is not only pedagogically driven, but also influenced by classroom environment factors, and these perceptions can vary among different fields of study. This breadth of research collectively underscores the imperative for educational institutions to foster a holistic learning environment that encourages robust student engagement, which is intricately linked to learning satisfaction and academic achievement (Guo, 2018; Haug et al., 2019). A great deal of research has been done to explore the power of engagement, but it becomes pertinent to further ask whether engagement can be a transformative and impactful way to illicit greater learning outcomes and course satisfaction.

Research Question

Building on the body of research that explores classroom learning engagement and outcomes, one is compelled to ask whether the degree of engagement directly affects the amount learned. While this seems like the perfect research question to serve as the scaffolding for this analysis, it becomes pertinent to understand the type of data that will be utilized. The research data used in this analysis is a survey that asked students to express their opinions and feelings about classroom engagement level and the amount they learned. However, as some researchers have observed, the perception of learning doesn't always equate to actual learning or mastery of learning objectives (Deslauriers et al., 2019). Consequently, the research question should be adjusted to reflect that the data observed in this study is based on students' perceptions of engagement and learning. The research question is thus as follows:

Are perceptions of course engagement associated with perceptions of learning?

This question will serve as the framework guiding the statistical analysis in this research. Before examining the actual data, it is essential to establish a hypothesis to direct the forthcoming analysis.

Hypothesis

Based on the research reviewed in the initial section of this write-up, there are several indications that an enhanced frequency of interactivity in the classroom may indeed result in a higher level of learning and goal achievement. These indicators can be used to formulate a hypothesis that will be bolstered by a statistical analysis using opinion survey data from an extensive course

evaluation survey. It should be noted again that the hypothesis will be based on the perception of learning rather than definitive evaluations that measure or assess skill attainment, knowledge retention, or the achievement of learning goals. This being said, the hypothesis that will be driving this research analysis forward is that:

Students who perceive a course as being engaging are more likely to feel that they have learned a good amount from it.

As this research write-up delves into the process of statistical data analysis, it is first important to describe the data set being used, the variables from this data set that will act as the variables in the statistical analysis, and how these variables have been altered or reconstructed to fit the goals of this research write-up.

Data

The data being used in this analysis is extracted from a larger body of data collected from a course evaluation survey that was administered to students at Georgetown University. Most questions in this survey were aimed at capturing students' feelings and overall opinions about different facets of the instructor and classroom experience. The two most pertinent survey questions, and their answer options, whose data is most relevant to the research questions are as follows:

The course content engaged me:	**On a scale of 1 to 5, how much did you learn in this course?**
1- Strongly Disagree	1- Very Little (1)
2- Somewhat Disagree	2- 2

3- Neither Agree Nor Disagree	3- 3
4- Somewhat Agree	4- 4
5- Strongly Agree	5- A Great Deal
6- N/a	

These questions are perfect in the sense that they provide survey data that will help gauge both the perception of engagement and the perception of learning. However, the questions also provide data that is not as helpful for supporting the research analysis. Firstly, the data that shows whoever chose choice 6 for the "engagement" question can be removed, as the "N/A" answer doesn't help gauge the level of engagement. Additionally, seeing that these survey questions (after excluding answer choice 6) have answer setups that are on a five-point scale, it would be more efficient to exclude the data from the middle choices (Answer choice "3" under both questions).

Excluding the midpoint or "neutral" option from a 5-point scale is beneficial because it compels respondents to make a decisive choice instead of selecting a neutral option as a "cop-out". This may happen when respondents are uninformed about the survey content material, lack the motivation to engage with the survey, or want to shy away from providing a socially unacceptable answer. Therefore, removing the midpoint can potentially lead to more accurate and telling data by discouraging non-committal or default responses that can skew the results (Chyung, 2020).

Since this survey already included the midpoints, the answers for the midpoints will instead be excluded from the data analysis, as the neutral answers that students may have chosen out of disinterest or ambivalence will not help reach an inference regarding engagement and learning perception.

When performing the data analysis, the remaining four answer choices will be restructured into two answer choices that denote a positive or negative response. If someone answered the first or second answer choice option on the survey, it can be inferred that they felt negatively about engagement or learning perception. If they answered four or five, one can infer that they felt positively. In this way, the deleted neutral point was useful, as it shows the dividing point between a positive or negative response. The reconstructed questions are as follows:

The course content engaged me	**How much did you learn in this course?**
1-Disagree	1-Not Much
2-Agree	2-A Good Amount

Now that the questions have been chosen and restructured, they will be recoded as such for the data analysis processes that will be undertaken in the Statistical Package for the Social Sciences (SPSS) software. SPSS will clump all the survey responders that chose one or two under the "Disagree" category for the engagement question, and under the "Not Much" category for the learning question. The respondents who chose answers four or five will be subsequently routed into the "Agree" category for the engagement question, and the "Good Amount" category for the learning question.

Data Analysis

The results portion of this write-up will involve using SPSS for descriptive statistics and a bivariate correlation analysis. Descriptive statistics will be utilized to outline the basic features of the collected data, thus offering a visual summary of the relevant survey responses. The descriptive statistics will include the mean, more commonly known as the average, which is calculated by

adding all the values together and then dividing by the number of values. The descriptive statistics will also include measures of variability, such as the standard deviation. The standard deviation is a measure of how dispersed the data is in relation to the mean.

The bivariate correlation analysis will be utilized to provide insight into the relationship between the course engagement perception and learning perception variables. This analysis will provide an assessment of the direction and strength of the linear relationship between the chosen variables. Bivariate analysis is particularly appropriate for this research question because it aims to reveal the strength and direction of the relationship between two distinct variables.

This analysis type is well-suited for exploring the connection between two continuous variables. It offers a clear and uncomplicated way to gauge the strength and direction of the linear relationships between these variables, bypassing the complexities associated with controlling for multiple factors that more advanced multivariate analyses demand.

It should be noted that a bivariate correlation analysis does not assume causality; It simply determines whether an association exists and determines its strength level. This is an important aspect of educational research where many variables may be correlated, and direct causality can rarely be established without the use of controlled experiments or more complex models.

The bivariate correlation analysis will reveal a Pearson correlation coefficient, which indicates the relationship between student engagement and perceived learning outcomes. This coefficient, denoted as ‘R’, ranges from -1 to +1, indicating a negative or positive correlation, respectively. 'R' close to 0 indicates no linear correlation. The analysis also yields a p-value. If this value is less than 0.05, it generally indicates a statistically significant correlation, indicating a low probability that the observed correlation occurred by chance. If the value is less than .001, it indicates a very high level of statistical significance.

Results

A descriptive statistics analysis was run on the variables “Perception of Engagement” and “Perception of Learning”. These variables were represented by the questions and answer sets below:

The course content engaged me	**How much did you learn in this course?**
1-Agree	1-Not Much
2-Disagree	2-A Good Amount

After running the analysis, SPSS produced a visual table providing information on the mean (M), the standard deviation (sd), and the total number of valid responses for each question (N). The table is depicted below:

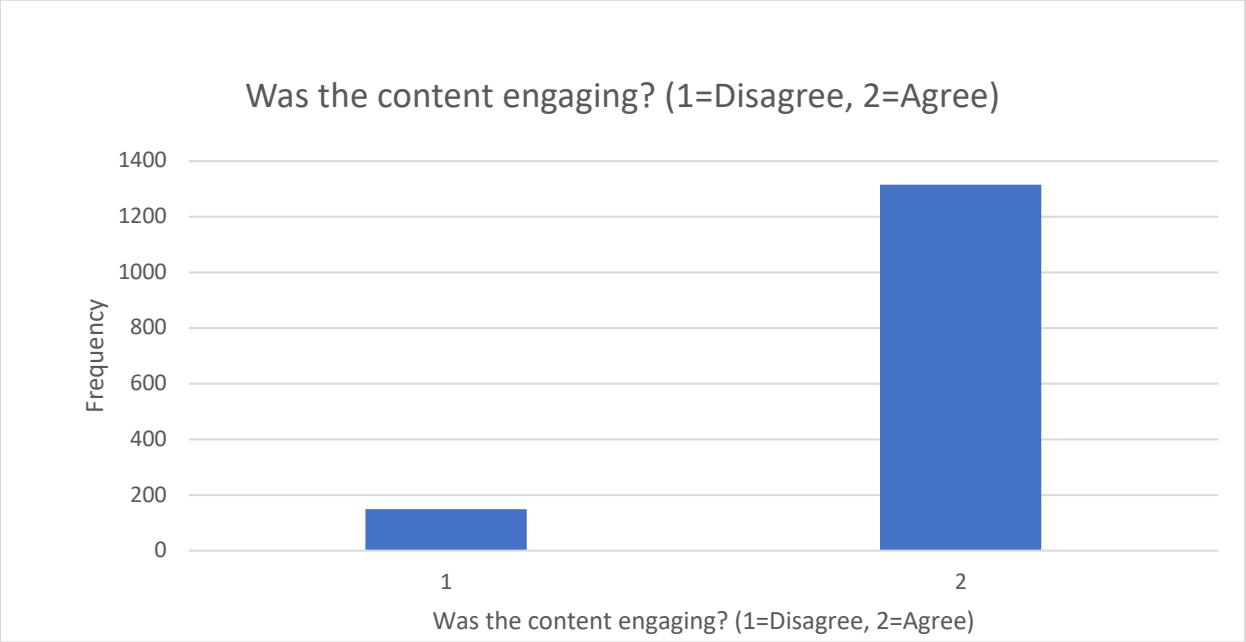
Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Was the content engaging? (1=Disagree, 2=Agree)	1464	1.00	2.00	1.8982	.30246
How much did you learn in this course? (1=Not Much, 2=A Good Amount)	1352	1.00	2.00	1.9393	.23878
Valid N (listwise)	1275				

For the question concerning engagement perception, 1464 surveyed students had valid responses (N=1464). On a 1 to 2 scale, with one denoting “Disagree” and two denoting “Agree”, the mean response of all the gathered surveys was 1.8982 (M=1.8982) with a standard deviation of 0.30246 (sd=.30246). As you can see, the mean is leaning heavily toward the “Agree” option,

and the standard deviation shows that the responses were clustered relatively close to the mean. This being said, one can infer from this information that the majority of students agreed that the content was engaging. In case this still seems nebulous, one can view the bar graph below to see how the number of responses was distributed across both answer options:

Figure 1: Engagement Perception

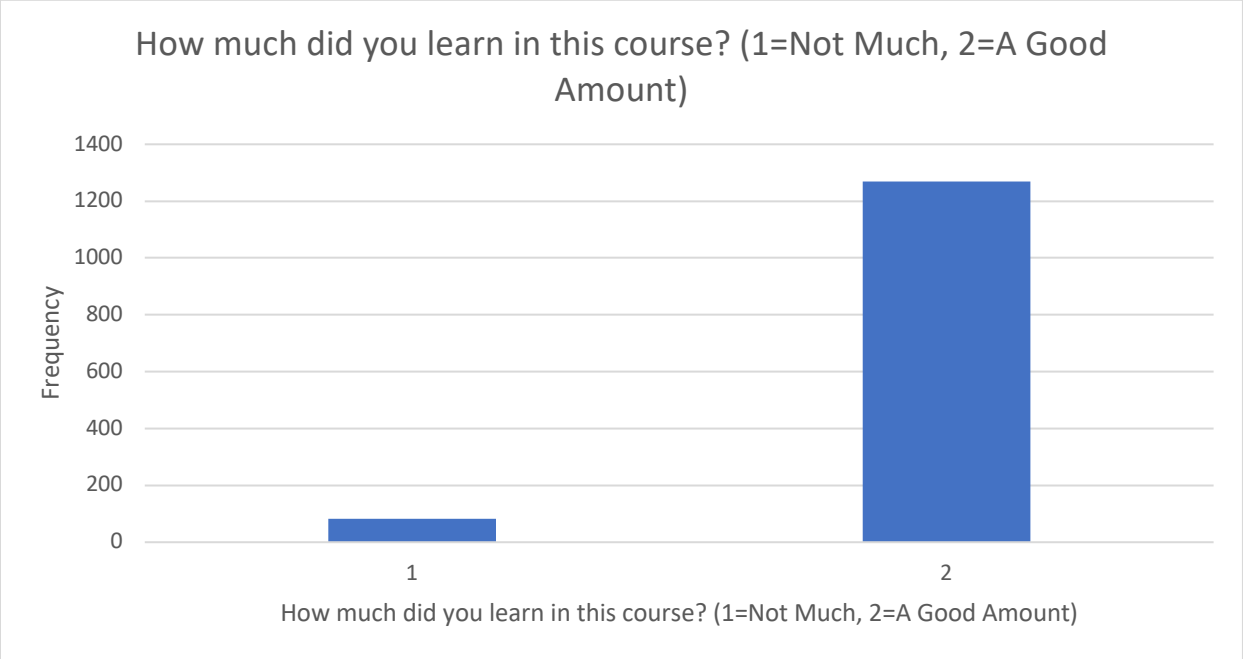


As one can see from this visual depiction, the majority of surveyed students most definitely agreed that the content was engaging.

For the question concerning learning perception, 1352 surveyed students had valid responses (N=1352). On a 1 to 2 scale, with 1 denoting “Not Much” and 2 denoting “A Good Amount”, the mean response of all the gathered surveys was 1.9393 (M=1.9393) with a standard deviation of 0.23878 (sd=.23878). As you can see, the mean is leaning heavily toward the “A Good Amount” option, and the standard deviation shows that the responses were clustered

relatively close to the mean. This being said, one can infer from this information that the majority of students believed that they learned “A Good Amount” from the course. One can view the bar graph below to see how the number of responses was distributed across both answer options:

Figure 2: Learning Perception



As one can see from this visual depiction, the majority of surveyed students believe that they learned “A Good Amount” in the course.

After the descriptive statistics analysis was completed, a bivariate correlation analysis was run on the same question data. The results of the analysis are visually depicted below:

Table 2: Correlation Analysis

		Was the content engaging? (1=Disagree, 2=Agree)	How much did you learn in this course? (1=Not Much, 2=A Good Amount)
Was the content engaging? (1=Disagree, 2=Agree)	Pearson Correlation	1	.700**
	Sig. (2-tailed)		<.001
	N	1464	1275
How much did you learn in this course? (1=Not Much, 2=A Good Amount)	Pearson Correlation	.700**	1
	Sig. (2-tailed)	<.001	
	N	1275	1352

**. Correlation is significant at the 0.01 level (2-tailed).

1275 students had valid responses for both of the questions that are under analysis (N=1275). There is a highly statistically significant and positive correlation between the variables *engagement perception* and *learning perception* (R=.700, p<.001). This being said, the analysis points to the conclusion that if students perceived the course content as engaging, the students were also statistically significantly more likely to believe that they learned a good amount from the course.

Discussion

Analyzing the results of the descriptive analysis, one can see that overall, students had positive responses when asked to rate their perceptions of both classroom engagement and overall learning. Excluding the neutral and negligible answer categories helped paint a much clearer

picture by eliminating any possible “throwaway” answers and filtering out ambivalence or inattentiveness regarding the survey.

The bivariate correlation analysis provided an even deeper insight into how the two variables are related to each other. As seen by the positive Pearson correlation value of .700, the variables had a positive correlation with each other. If that value was a negative number instead, it would have informed us that there was a negative correlation and that the increase of one variable would mean the decrease of the other. In addition to having a positive correlation value (R=.700), the correlation was also found to be statistically significant. When the significance value is less than .001, this means that the correlation between the variables is highly statistically significant. Essentially, statistical significance means that this relationship is extremely unlikely to have occurred through chance or coincidence.

The bivariate correlation analysis provides statistical backing that if a student perceives a course to be engaging, they are statistically significantly more likely to believe that they learned a good amount from the course. Consequently, the hypothesis made at the beginning of this write-up is arguably supported by the correlation analysis of the statistical data at hand. This means that if one looks at the information gathered from this analysis, one would have good support to recommend that educators increase the level of class interactivity in order to leave their students with a feeling of intellectual fullness.

However, it should once again be qualified that this statistical analysis was based on opinion data. One cannot take this analysis and extrapolate that more interactivity leads to more learning. Perceptions of interactivity and learning are not the same thing as measured and proven interactivity and learning levels. Even though one cannot extrapolate further than the realm of perception, this analysis can be viewed as another piece of research that should get educators and

researchers alike more interested in the complex connections between interactive classroom experiences and learning outcomes.

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