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# Impact Of the Digital Tool of Zoom App on Students' and Their Academic Engagement at University Level

**Muhammad Usman**
B. Ed (Hons) Elementary Scholar, Department of Education, Government College University Faisalabad.
mu608157@gmail.com
**Sofia Shafique**
B. Ed (Hons) Elementary Scholar, Department of Education, Government College University Faisalabad.
ahmadshafique11223@gmail.com
**Ms Asma Ishtiaq (Corresponding Author)**
Lecturer (BPS-18), Department of Education
Ishtiaqrajpoot1122@gmail.com
**Hadia Maryam**
B. Ed (Hons) Bridging Scholar, Department of Education, Government College University Faisalabad.
hadiamariam2002@gmail.com
**Rabbia Sultana**
M.phil Scholar, Department of Education, Government College University Faisalabad.
rabbiia282001@gmail.com
**Muhammad Ashfaq Hassan Babar**
PhD Scholar, Department of Education, Govt. College University, Faisalabad, Punjab, Pakistan
ashfaqhassan75@gmail.com

## ABSTRACT

*Digital tools are becoming increasingly central to the delivery of teaching within a university setting. This means that how students engage with these can affect the benefits they get out of them. This study aimed to explore how students felt they engaged with learning through zoom at a university level. A quantitative cross-sectional study was conducted to discover how students felt they were engaged with learning. Results were described with 200 participants in relation to 3 areas: behavioural and cognitive engagement, engagement and attendance and overall academic engagement. These results were gathered using a 5-point scale. Engagement and attendance had the highest mean scores (M= M = 3.42, SD=SD = 0.83), followed by overall academic engagement (M=M = 3.35, SD=SD = 0.82), and then behavioural and cognitive engagement (M= M = 3.29, SD=SD = 0.89). Looking at differences between gender there were 104 males (M=M = 3.27, SD=SD = 0.82), and 96 females (M=M = 3.43, SD=SD = 0.81). The t-test showed no significant difference at .05 level (t(198) = -1.40, approximate p-value (two-tailed) = 0.163). Overall, it appeared that students reported moderate levels of engagement. Engagement and attendance were slightly higher than behavioural and cognitive engagement. Due to the descriptive and cross-sectional statistics there is no evidence to suggest that engagement levels changed due to using zoom. Further conclusions would be*

*better with confirmed information about the instrument, sampling, reliability and clear analysis of factors that may have impacted.*

***Keywords**: Zoom; Academic Engagement; University Students; Online Learning; Behavioral Engagement; Cognitive Engagement*

## 1. Introduction

Digital tools are embedded into teaching strategies in universities, including lectures, seminars, one-to-one sessions and group work. Video conferencing tools can be used to make teaching more accessible and keep students in contact with their teachers. However, just because students have accessed the video conferencing platform it does not mean they are engaged in the learning process. They may not have been fully focused throughout the session. Engagement can be looked at in relation to academic engagement.

Engagement in academia is often seen as involving three areas; behavioural, emotional and cognitive (Fredricks et al., 2004). Behavioural engagement may involve students attending, completing tasks and participating. Cognitive engagement involves putting forth effort, using strategies and wanting to understand difficult concepts. These areas overlap but should not be seen to be interchangeable. A student may be present in class but not fully engaged cognitively. Alternatively, they may be thinking deeply about the topic, but not saying much. Studies have shown that there is more to online learning than the technology used. The quality of learning was affected by how the activities are designed, how much interaction there is, how present the teacher is, how much feedback is given, reliability of internet connection and the learning environment (Garrison et al., 2000; Martin & Bolliger, 2018). Although Zoom provides many features, such as real-time audio and video, chat, screen sharing and breakout rooms, this does not automatically mean students will be actively learning. How teachers and students utilise the features was determined how useful they are? This article looks at the summary statistics provided for 200 university students. This study was focused on the three areas of engagement reported in relation to learning via Zoom. This manu script was clearly state that there is no causation. There is no control group, pre-test post-test or anything similar within the tables provided.

## 2. Problem Statement

Video conferencing software is being used more in universities. However, it is important to know if students felt engaged during these classes. Simply knowing how much they used the platform and attended was not give a full picture of their engagement. Engagement involves cognitive effort and active participation. The problem identified here is to identify how engaged students felt during their university learning via Zoom and look at if there is a gender difference in overall academic engagement from the data provided.

## 3. Objectives of the Study

1. To evaluate the engaged students were behaviourally and cognitively during Zoom-assisted learning sessions.
2. To investigate engaged students were during class and how well they attended classes during Zoom-assisted learning.
3. To find out the overall level of academic engagement university students had.
4. To Compare the average academic engagement scores between males and females using the summaries provided.
5. Discuss the implications of these findings on the design of online teaching within universities without making assumptions.

## 4. Research Questions

1. How behaviourally and cognitively engaged were students during learning via Zoom?
2. How engaged were students during class and how well did they attend?
3. What was the overall level of academic engagement?
4. Is there a significant difference in academic engagement scores between males and females using the data provided?

## 5. Literature Review

### 5.1 Understanding Academic Engagement

Engagement is often seen as a relationship between the student and the learning environment. Fredricks et al (2004) have conducted a meta-analysis of engagement and found that there are three types of engagement: behavioural, emotional and cognitive. Behavioural engagement relates to student involvement, cognitive engagement relates to the amount of effort they put into learning, and emotional engagement relates to their feelings towards learning. Whilst this can help you to create ways to measure engagement, you would want to ensure your operationalisation of engagement fits with the questions within your questionnaire. Engagement is important in a university setting to ensure students are putting effort into their learning. However, if students have not been assessed on their achievements, then you cannot make assumptions that higher engagement scores relate to higher achievements. A self-report scale will only tell you what students believe or what they claim to do. It will not show you the improvements in their grades, retention or mastery.

### 5.2 Engagement During Zoom-Assisted Learning

Live video conferencing can be used to explain, discuss, ask questions and interact with peers. The Community of Inquiry model suggests that meaningful engagement can be created online through teaching presence, social presence and cognitive presence (Garrison et al., 2000). This could be achieved by having clear structure, meaningful facilitation and feedback (teaching presence), respectful interaction and a sense of connection (social presence) and inquiry, explanation and reflection (cognitive presence). A review of strategies to engage students online has shown that interaction between the instructor, students and content is important (Martin and Bolliger, 2018). This means that instructors can utilise Zoom as a way to facilitate learning. Using short polls, structured discussion questions, breakout room tasks, collaborative documents and allowing students to ask questions can provide students with tangible reasons to engage. These should be tailored to your class size, topic, accessibility, bandwidth and students' need for privacy.

### 5.3 Attendance vs Engagement

Attendance can be used as a measure of behavioural engagement however this is a very limited view. Students may be attending due to it being compulsory but not really paying attention. They may also be engaging via the chat or through collaborative activities rather than speaking on camera. A combined score of behavioural and cognitive engagement could hide any differences in how behaviourally engaged students are and how much cognitive effort they are putting in. As this is a self-report scale you should explain what the questions were measuring, how they were scored, reliability and evidence to support the structure of the scale.

### 5.4 Gap in Research

The results provided give a narrow snapshot of how students felt they were engaging with their learning in three areas. This can help to identify which area had the higher average score and allows for some basic comparison of a small group. However, there is a lack of information on the institution, sampling method, questions, time frame and previous experience with online learning to fully understand the results. Therefore, you can only make some initial findings from this sample and cannot make assumptions about Zoom or all university students.

## 6. Method

### 6.1. Design

This is a quantitative descriptive cross-sectional study looking to compare genders. It is important to ensure that this is accurate in relation to the summary tables provided. Cross-sectional data can give a snapshot of participant responses and therefore patterns can be observed, however it is not possible to determine causality between using Zoom and increased engagement.

### 6.2. Participants

There were N = 200 university students included in the descriptive data. 104 males and 96 females were included to compare genders (total = 200). There was no information provided about the university, course, semester, age, how participants were recruited, response rate or when the data was collected. This will need to be taken from the original study.

### 6.3. Materials

There were 3 scores provided in the results section: behavioural and cognitive engagement, engagement and attendance in classes and academic engagement. All scores ranged from 1.00-5.00; therefore, it is likely that there were 5 points on the scale. There was no information provided about what scale was used, how many questions were included, what the questions were asking, if any questions were reversed scored, how the total score was calculated or where the measure came from. This information should be included in your answer. Evidence of reliability should also be included (e.g., Cronbach's alpha/omega). This should be calculated using the actual data rather than made up from the summary.

### 6.4. Analysis

Descriptive statistics were used to show how many participants there were, what the lowest score was, highest score, average score and standard deviation for each engagement category. An independent t-test was conducted to compare males and females using df = 198. The t-statistic was -1.40. This would equate to approximately p = .163 for a two-tailed test. Therefore, in this manuscript we would use p = .163. However, it would be best to check the original statistical outputs before submitting. Exact p-values, confidence intervals, effect sizes, assumptions and any decisions around missing data should be confirmed using the original data.

### 6.5. Ethics

The information provided does not include an ethics approval reference, consent and data protection. In the final article you should state if the study received institutional review/ethics approval, how informed consent was gained, how participants were assured that their participation was voluntary and how their confidentiality was assured. Do not state that the study received approval/consent if this was not the case.

## 7. Results

### 7.1 Descriptive analysis of each factor of Zoom app learning

Table 1 presents the supplied descriptive statistics for the three reported dimensions.

| Engagement dimension | N | Min | Max | M | SD |
|---|---|---|---|---|---|
| **Behavioral and cognitive engagement** | 200 | 1.00 | 5.00 | 3.29 | 0.89 |
| **Class engagement and attendance** | 200 | 1.00 | 5.00 | 3.42 | 0.83 |
| **Academic engagement** | 200 | 1.00 | 5.00 | 3.35 | 0.82 |

Class engagement and attendance had the highest average scores (M = M = 3.42; SD = 0.83). Overall academic engagement was next (M = M = 3.35; SD = 0.82). Behavioral and cognitive engagement had the lowest average scores (M = M = 3.29; SD = 0.89). All means were above the middle value on a scale of 1 to 5, with the middle value being assumed as 3. The differences between the means are small, and should not be considered significant as no statistical analysis was given to compare the three dimensions. The standard deviations range from 0.82 to 0.89, which suggests there was some variability in the scores. Behavioral and cognitive engagement have the higher standard deviation score, which suggests that the scores were more spread out. The data does not indicate how individuals performed on each item or if there was any difference in scores between institutions, disciplines or years on the course.

### 7.2 Comparison of academic engagement by gender

| Gender | N | M | SD | t | df | p (two-tailed, approx.) |
|---|---|---|---|---|---|---|
| **Male** | 104 | 3.27 | 0.82 | −1.40 | 198 | .163 |
| **Female** | 96 | 3.43 | 0.81 | | | |

The t-value and degrees of freedom have been taken directly from the table. The p-value has been roughly calculated based on the t-value and df = 198 (t=-1.40). This should be double-checked against the original output. The value given of 0.00 does not match with this t-value.] The mean score for female students was 0.16 points higher than males (M=M = 3.43, SD=SD = 0.81) compared to (M=M = 3.27, SD=SD = 0.82). As there is no statistically significant result (t(198) =-1.40, p≈.163) at the conventional alpha level of .05, we cannot conclude that there is a difference in means between the populations based on this test. This shows there is a pattern in the sample data for females to have a higher score, but does not prove that engagement is determined by gender. An effect size and confidence interval should be added.

## 8. Discussion

Overall, there appears to be a moderate positive pattern in the descriptive statistics, assuming a mid-point of 3 for the scale. The highest mean was for class engagement and attendance. This could indicate that students felt it was relatively easier to attend/participate

in the set sessions compared to engaging in both behaviours and mentally in the behavioural/cognitive score. This is just an assumption as we do not have item level data or information on how the scales were created. The lowest mean was for behavioural and cognitive engagement. This could be a useful insight for instructors to look into further from student feedback and observations. Whilst online sessions can provide opportunities for students to visibly engage, there is no guarantee they are engaging cognitively. By asking them to explain concepts, compare answers, write short reflections or apply ideas to new problems we can encourage them to think more. Overall engagement online relies on meaningful interaction and good course design rather than just the technology (Garrison et al., 2000; Martin & Bolliger, 2018).

There is a small difference in the sample means when comparing genders. However, after correcting the interpretation of the t-value given, it is not statistically significant at the alpha level of .05. We cannot say that female students were significantly more engaged. Further, this does not show that the two groups were equal. As this was not statistically significant, we cannot reject our null hypothesis based on the evidence given. In future we should include confidence intervals, effect sizes, check assumptions and the real p-value from the source. Overall, we should not conclude that there was an impact from Zoom. The tables give us insights into how engaged students felt within a Zoom learning environment but there is no control group or time-based evidence. To better investigate an impact, we could look at pre/post, similar courses using different teaching methods, or use a mixed methods approach with validated engagement measures.

**9. Conclusion**

Overall, in the sample of 200 university students, class engagement and attendance had the highest mean score. This was followed by overall academic engagement, behavioural engagement and cognitive engagement. When comparing genders, there was a 0.16 difference in the sample means. The t-value given does not show a statistically significant result, with the p-value being roughly .163 (two-tailed). This gives us a snapshot of how engaged students felt within a Zoom supported learning environment, however it does not prove that engagement increased due to Zoom. Good course design, meaningful interaction, valid measures and clear statistical reporting will help us to get more accurate conclusions.

**10. Recommendations**

Sessions should be designed for clear learning objectives. 2. Include some structure to your interactions. You could include short polls, guided interactions in chat, breakout room activities, peer explanations and formative feedback. Ensure all activities have clear learning objectives. Provide variety in how students can interact. This could include audio, chat, shared documents and private channels for questions. This will ensure engagement is not solely from using their camera or talking frequently. Universities should consider the students' ability to connect, access devices, studying environment, accessibility and privacy. 6. Future research should use a validated measure of engagement. Provide examples of items, how they were scored, reliability and validity evidence. 7. Check the output for the gender comparison. Provide precise p-values, confidence intervals, effect sizes and check assumptions. Use longitudinal, quasi-experimental or mixed methods to investigate impact. Look at other outcomes besides attendance, such as cognitive engagement and academic achievement if relevant.

**11. Limitations**

There are several limitations to this study. Firstly, the manuscript was written using the summary statistics only. There was no raw data or item level data to confirm results independently. Secondly, we do not know any information about the institution, sampling method, response rate, source of questionnaire, reliability or when the data was collected. Thirdly, as this is descriptive data there is no evidence to suggest causality. Finally, the p-value given does not match with the t-value (0.00). This should be corrected. Self-report measures can be affected by recall bias, social desirability and personal interpretation of the items. These should be made clear

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