**Embedded online activities to improve lecture attendance in an engineering course**

**Abstract**

Non-attendance of lectures is a growing trend at universities worldwide. The determinants of university students’ attendance are of interest to university teachers and management and have been the subject of ongoing research in the last decade. There had been studies on finding the reasons for student’s absenteeism and how can a student be motivated to come to lectures. Studies suggest that incorporating active learning strategies in the lectures enhances student engagement and it is more likely that they will attend the lectures. Whether or not student engagement is a major factor behind attending the lecture has been debated over the years, but the empirical studies have been few and inconclusive. The studies also report and increased use of portable devices inside the classroom often associated with the non-academic purposes resulting in degraded performance. This social behaviour can be positively transformed so that it assists students with the learning.

The aim of this research is to study the impact of online activities embedded in the lecture design to engage students during class time with the overall goal of improving students' attendance in lectures. This study is exploratory in nature and utilises both qualitative (focus groups data) and quantitative (system logs from Canvas) approaches. Audio recorded focus group discussions were transcribed and the written text thematically analysed. Remotely collected system log data is summarised using descriptive statistics.

Our experiment suggests that embedded online activities may help achieve these goals. The students can be engaged in the class through the use of digital devices to complete online activities during the lecture. This engagement fosters the positive use of technology and, also, results in increased attendance and better learning gains. Moreover, students were of the view that such online activities should be done in an allocated time and provide meaningful teacher-student interactions, an integral component of successful student engagement during lectures.

1. **Introduction**

Universities are ready to embrace a new class of students who are born and raised in the twenty-first century which has seen a tremendous growth in communications and information technology. As a result, digital gadgets and technologies have become indispensable components of their lives which have also significantly changed the way students are educated. Consequently, traditional methods of university teaching need to be replaced by the new ones which are increasingly based on technology (Fuh & Paul; Stîngu & Iftimescu, 2016). Wilson (2004) has accentuated that traditional methods of instruction will no longer be good enough in a society that has undergone “a paradigm shift from emphasizing teaching to emphasizing learning” (p.119). The students are no longer fascinated by the transmission mode of teaching and prefer the active classroom environment where they are engaged more and more through the technology (Crook, Harrison, Farrington-Flint, Tomás, & Underwood, 2010; Hamann & Wilson, 2003). The lecture method is considered a relatively poor instructional approach for maintaining student attention which begins to decline after 10-15 minutes (Bligh, 1998; Fuh & Paul; Stuart & Rutherford, 1978). Short attention spans are characteristics of the current student generation, also termed as the restless generation (Honore & Schofield, 2010; Kandlbinder, 2010). Wilson (2013) links the issue of boredom to attention, academic performance and motivation. This implies that teacher should deviate from traditional ways of teaching and make use of digital technology to provide today’s students with suitable learning environments to improve their learning (Law, Lee, & Yu, 2010).

However, lectures are still the most common form of teaching in higher education as they are economical (McGarr, 2009). With large classes, teachers are able to deliver content at scale and simultaneously and involve less preparation in relation to other modes of teaching (Jones, 2007; McGarr, 2009). But, many lecturers fail to engage students as they take little account of contemporary thinking of student centred learning strategies as claimed by Tormey and Henchy (2008). Mann and Robinson (2009) quoted a significant finding from a survey of 211 British university students indicating that 59% found lectures boring in at least half of their classes and 30% find most or all of their lectures boring. Another survey conducted by UCLA Higher Education Research Institute on nearly 250,000 college freshman at more than 500 colleges and universities, found that 40% of the students report that they are frequently bored in class resulting in nonattendance of the lectures (Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010) which leads to nonattendance of the lectures.

Non-attendance of the lecture by students is not a desired academic behaviour as there exist a positive relationship between lecture attendance and academic performance (Alija, 2013; Credé, Roch, & Kieszczynka, 2010; Kassarnig, Bjerre-Nielsen, Mones, Lehmann, & Lassen, 2017). Alija (2013) in a study made a comparison between students who were absent from classes and got a failing grade or did not complete and those who passed in certain courses and found out that students who regularly attend classes have 8 times bigger chances to get a passing grade. The question is how students can be brought to the lecture and then retained? The research suggests that students need to be engaged with their studies in order to retain their presence in the class room (Fayombo, 2012; Fayombo, Ogunkola, & Olaleye, 2012; Fuh & Paul; Jones, 2007; Kozma, Belle, & Williams, 1978; Pryor et al., 2010; Tormey & Henchy, 2008; Trowler & Trowler, 2010). If students are not engaged properly, they are easily distracted through the use of digital devices in classroom as it is common these days. A recent study established that 99% of undergraduate students own a mobile Internet-enabled device, which let students to access games, social media, email, chat, etc., causing distraction for themselves (Colb, 2006; Murray, 2011) and as well as the surrounding students (Yamamoto, 2007). These distractive multi-tasking behaviours result in lower engagement and performance (Kornhauser, Paul, & Siedlecki, 2016; Kraushaar & Novak, 2010).

However, it is nearly impossible to shun personal mobile technology from the classrooms, but instead it can be used to engage with students at a level they are familiar with (Dahlstrom, Brooks, & Bichsel, 2014; Rothwell, 2016). The otherwise negative behaviour of students “playing with their phones etc…in class” can be transformed into a positive learning experience by making use of these devices for pedagogical purposes, for example, communication and peer collaboration etc. (Bowen & Pistilli, 2012). Dobbins & Denton (2017) used mobile application to receive and present messages from students’ mobile devices that the teacher may then share. The use of personal mobile devices has been implemented as collaborative tools to increase motivation around exam preparation (Lopez et al. 2015). Therefore, the use of digital devices can make a positive impact on students’ learning within the classroom (Witecki & Nonnecke, 2015).

We aim at bringing the student to the lecture and retain them by engaging them more and more through the digital devices thus restricting their non-academic use. In this way, the students are less likely to miss lectures because they will be actively involved in the classroom activities (Fayombo, 2012). In particular this study seeks to:

* Explore students' experience with embedded online activities during lecture time and the impact on lecture attendance using focus groups.
* Analyse students' usage data of learning activities and resources in Canvas to evaluate students' online engagement.

1. **Literature Review**

Non-attendance of lectures is a growing trend at many universities and an apparent world-wide issue (Gump, 2006). It is not a new phenomenon and studies suggest that attendance has been a problem for decades (Beard & Senior, 1980). There is a historical account of drop in attendance at sermons at Oxford University dating back to the 14th century Tuchman (1979) states 'dwindling attendance at Oxford was deplored in sermons by the masters'. A number of possible reasons of non-attendance have been suggested in the literature including students’ attitudes, teaching styles, pedagogies, changing lifestyle and technology (Massingham & Herrington, 2006) which are briefly explored below. There are many reason for not attending lecture perceived as academy-centred such as: failure to connect the content of the lecture to assessment or the ‘real world’, the availability of lecture material in online forms, unexciting, unchallenging teachers, timing of lectures and competing assignment commitments (Gump, 2006; Nicholl & Timmins, 2005). In an earlier study at the University of Canterbury, New Zealand, Hunter and Tetley (1999) interviewed 168 full-time students about their reasons for attending and found that tertiary education students will not miss lectures that were interesting, those where they liked the subject content or in which the teacher was good.

In order to attract students to come to lectures, teachers must be able to analyse and synthesise complex material, organize and structure it, and clearly explain it to them (Bliss & Ogborn, 1990). This might defeat the purpose of modern and contemporary education suggested by the constructivists which require students to analyse, synthesize, and explain thus reducing the teacher’s role merely to a facilitator. Furthermore, school education focuses more on problem-solving, collaboration, authentic contexts, and actions with very little emphasis on teacher-centred instruction and individual learning. In contrast, university teaching is still mainly teacher-focused presenting students with a mode of delivery that can result in skipping classes(Mann & Robinson, 2009).

There are many other factors behind students’ absence from class. For example, students are less likely to attend classes if a lecture competes with a coursework deadline or is conducted at a time that is deemed not suitable for students (Khong, Dunn, Lim, & Yap, 2016) or if there is incompatibility between a personal learning style and teaching style (Credé et al., 2010). Absenteeism is also linked with how students perceive the lecture, either as the source of information towards exams or other assessments (O’Farrell, 2002) or for obtaining an overview of concepts and ideas of the taught material. Since most universities provide the course content to students via modern online tools in addition to lectures, students often do not consider it necessary to come to the lecture. Moreover, students’ motivations to learn and acquire and education is increasingly seen as a means towards a degree for employability, rather than being valuable in its own right (Coxon, Jenkins, Marshall, & Massey, 1994).

**Student engagement predicts success**

Numerous studies have explored the impact of class attendance on student’s performance. Results suggest that there is a robust relationship between attending the lectures and student’s performance and even suggest that the attendance in the lecture can better predict the grades than any other known predictor of academic performance (Alija, 2013; Credé et al., 2010; Kassarnig et al., 2017; Rodgers, 2001). But, universities are finding it hard to fill lecture theaters, keep students enthused and attending for the duration of their course or paper. The students will only come to the lecture if they are not bored and this can only be achieved by engaging them in the class which will increase their probability of attending the lectures (Trowler & Trowler, 2010). A literature review conducted by Prince (2004) and meta-analysis by Freeman et al. (2014) found that students learning can be optimised through active learning and small-group activities. Therefore, it is important that students be engaged in the lecture to be able to maintain lecture attendance at a high level.

For example, student engagement in class can be achieved by ‘Pausing’ to provide students with an opportunity to ask questions, clarify and consolidate their notes with others, group discussion(s), debates, peer teaching, short ungraded exercises and allowing them to share their work (Fayombo, 2012; Trowler & Trowler, 2010). Students can also be engaged through classroom experiments (Emerson & Taylor, 2004), clickers (Ghosh & Renna, 2009) and short demonstrations. Clickers are particularly suitable in very large class settings if used as a response system to increase student engagement (Deslauriers, Schelew, & Wieman, 2011). Students should be engaged in activities that require them to reflect on ideas in doing things, thinking about what they are doing, can do it independently and have some form of feedback (Fayombo, 2012). This will put the responsibility of learning on learners and motivates them to become active in the learning process.

**Motivation**

The literature reports a direct relationship between student attendance in lectures and motivation (Beard & Senior, 1980; Unissa & Nagabhushan, 2017). A study by Lim (2004) also found that motivation is crucial for learning at university impacting on course satisfaction and students’ motivation to attend the lecture (Fujita-Starck & Thompson, 1994). Hull (1943) presented three different theories which can motivate a student; according to the ‘Drive Theory’, motivation is the outcome of the drive to satisfy the needs for survival which can be physical or psychological. For instance, an urge to work more to get money may outweigh the need for knowledge. ‘Incentive Theory’ describes the motivation as a phenomenon which is regulated by the external stimuli (Bolles, 1975). For example, if grades are not a hurdle in getting the desired job, the student may choose not to come to lecture as they might think that coming to the lectures will not help in achieving their goals. The ‘Theory of Motivational Orientations’ categorizes students as task-oriented, who do compare themselves with their peers and against their own expectation, contrasting with ego-oriented students who compare themselves to others to evaluate their performance and are interested in learning (Nicholls, Cheung, Lauer, & Patashnick, 1989). Students of the former category are more likely to give up after a failure as they think it is because of their lack of abilities.

Keller (1987) considers motivation as an important factor for learning whereby attention is a pre-requisite and forms an important element of motivation for learning. Keller’s ARCS (attention, relevance, confidence and satisfiability) model (1987) focuses on class room activities that enhance student engagement. Some of these activities are possible online and are designed to foster an engaging learning environment that provides feedback, fills students with confidence and satisfying them through some reward. The final component of the ARCS model is satisfaction which is directly linked with the level of motivation. Therefore, positive consequences in the form of praise or award can help students’ motivation.

**In-class activities using digital devices for improved attendance**

Handheld digital devices such as smartphones and tablets play a significant role in the everyday life of a modern student. Fried (year) conducted a study to find out the impact of portable devices (laptops) of a class delivered in a traditional lecture format. Students were allowed to use the devices freely. A comparison between users and non-users of digital devices revealed that those students who used devices in class were more distracted impacting on their learning.. Another study by Hembrooke & Gay (2003) confirmed that students in a non-laptop control condition significantly outperformed their laptop-using peers in test for content retention. Yet another study explored the relationship between student course engagement and the use of smartphones revealing that smartphone use is strongly related to lowered course engagement and performance (Witecki & Nonnecke, 2015). There are many other studies whose finding indicate that non-academic use of technology devices inside the classroom gives rise to multitasking (Junco & Cotten, 2011; Rosen, Carrier, & Cheever, 2013).

Yet, digital devices are increasingly used for pedagogical purposes. Dobbins & Denton (2017) used mobile applications to receive and present messages from students that the teacher may then share with the entire class. In another example, personal mobile devices have been implemented as collaborative tools to increase motivation around exam preparation (Lopez et al. 2015). Therefore, the use of digital devices can make a positive impact on students’ learning within the classroom (Witecki & Nonnecke, 2015).

The questions this study is attempting to explore are as follows: Can we use students’ addiction to devices to our advantage? Can we use digital devices in the classroom to increase student engagement and provide an active learning environment? Can we use it to provide prompt feedback on student’s learning and motivate them? Can we engage the student in some productive and related activity to counter boredom during the lecture?

In order to improve student’s attendance with a view to improve their performance through consolidating their motives and promoting classroom learning activities, the current study proposed to embed on line class activities using Xorroq to engage and promote the learning environment.

1. **Methods**

The study was conducted in the first semester of the academic year 2017. The data was collected through following sources:

* Attendance during lectures
* Focused-groups discussion with students
* Canvas activity data

Focus groups are widely used in academic research to to collect data to explore people’s perceptions and opinions on a phenomenon. The main components of this technique are data collection, interaction in a group discussion as the source of the data and researcher's active role in creating the group discussion for data collection purposes (Krueger, 2014; Stewart & Shamdasani, 2014). Focus group discussions were audio-recorded and transcribed into written text followed by thematic analysis (Saldaña, 2015).

Student attendance data was collected on an Excel spreadsheet during the lectures. The data was collected from a single class of 75 students (20% females and 80% males) over a period of 10 weeks. During week 10 student focus groups were held. Week 10 was chosen because it was towards the end of the semester, allowing students to have gained an understanding of the impact that embedded class activities can have on their studies and attendance. Since this was an intervention study, therefore, it required the approval from an ethics committee. This study has received ethical approval from the Human Participants Ethics Committee (UHPEAC) at The University of Auckland (Ref No.: 018848).

Embedded in class activities were designed keeping in view the Keller’s model of motivation and comprise multiple choice question synchronized with the lecture slides. The activities were conducted in an unstructured and uncontrolled environment to engage the students in the class. The activities were launched a few hours prior to the lecture and was open for responses until midnight so that students who could not attend the lecture were not disadvantaged and could participate in the activity. The feedback on the question was provided during the lecture and no specific time was allocated for the discussion. It was required that students launched the activity, read the question, listened to the teacher, wait for the part of the lecture where the related topic was discussed and then answer the question. In this way, students can engage with the lecture independent of teacher and receive feedback on their understanding. A very small percentage of the marks were also allocated for completing these activities as the reward according to Keller’s model (1987). During the first lecture, the principal investigators explained to all students about the online activities and addressed their concerns. A facilitator was appointed to record and analyse the findings from the focus groups to avoid the conflict of interest as the teacher himself is the principal investigator.

Focus groups are widely used in academic research to collect data to explore people’s perceptions and opinions on a phenomenon. The main components of this technique are data collection, interaction in a group discussion as the source of the data and researcher's active role in creating the group discussion for data collection purposes (Krueger, 2014; Stewart & Shamdasani, 2014). Focus group discussions were audio-recorded and transcribed into written text followed by thematic analysis (Saldaña, 2015).

Student attendance data was collected on an Excel spreadsheet during the lectures. The data was collected from a single class of 75 students (20% females and 80% males) over a period of 10 weeks. During week 10 student focus groups were held. Week 10 was chosen because it was towards the end of the semester, allowing students to have gained an understanding of the impact that embedded class activities can have on their studies and attendance. Since this was an intervention study, therefore, it required the approval from ethics committee. This study has received ethical approval from the Human Participants Ethics Committee (UHPEAC) at The University of Auckland (Ref No.: 018848).

Embedded in class activities were designed keeping in view the Keller’s model of motivation and comprise multiple choice question synchronized with the lecture slides. The activities were conducted in an unstructured and uncontrolled environment to engage the students in the class. The activities were launched a few hours prior to the lecture and was open for responses until midnight so that students who could not attend the lecture were not disadvantaged and could participate in the activity. The feedback on the question was provided during the lecture and no specific time was allocated for the discussion. It was required that students launched the activity, read the question, listened to the teacher, wait for the part of the lecture where the related topic was discussed and then answer the question. In this way, students can engage with the lecture independent of teacher and receive feedback on their understanding. A very small percentage of the marks were also allocated for completing these activities as reward according to Keller’s model (1987). During the first lecture, the principal investigators explained to all students about the online activities and addressed their concerns. A facilitator was appointed to record and analyse the findings from the focus groups to avoid the conflict of interest as teacher himself is the principal investigator.

1. **Findings**

Data were gathered using qualitative and quantitative methods i.e., focus group discussion and detailed individual student engagement with the online activities. The data analysis sought to provide an in-depth picture of the impact of this study on student attendance.

**4.1 Quantitative Data Analysis**

The students were asked to whether the activities were engaging or not. Most of the students agreed that these activities were engaging which is also supported by the data collected from Canvas and plotted in Figure 1 which shows the activities and the number of students who completed it. It indicates that online activities did manage to engage the students and, on average, 82% of the students completed the activities. It was further endorsed by the fact that each student was engaged 28 times for 11 activities and there were 30 views by each student for all 11 activities, meaning 3 views per activity. A slight decline in the participation can be seen over the period of time which can be attributed to meeting deadlines for course assignments towards the end of semesters.



**Figure 1: Student engagement and attendance**

On average, 82% of the students completed the activities which is slightly more than the lecture attendance which was around 72% on average with as low as 57% in one of the lecture. The student attendance in the class was recorded through head count whereas engagement was calculated by counting the number of online activities completed and submitted. We also observed a pattern that both physical presence in the class and online activity completion rates decreased as semester approached towards the end. As these online activities did not carry and significant marks, therefore, the instrumental students may be more likely to view them as unnecessary and place a low priority on attendance.

**4.2 Qualitative Data Analysis**

The analysis of interview data revealed two main themes relating to the in class activities and the attendance. In the first theme, students agreed that the activities engaged them but they were not in agreement with the quality of engagement. Similarly, in the second theme, students did not think the online activities were the main reason which motivated them to attend the lecture. However, everyone was in agreement that all in class activities should include lecture-student interaction component together with student-content-device to make it more meaningful and beneficial for students. The boost in attendance might be anticipated through enhanced quality of engagement.

**Student engagement**

Most of the students who participated agreed that they completed the in class online, or in other words engaged with them. They found it useful in one way or the other and reported that their initial impression was that the in class activities “looked more like a quiz.” Students also reported that they will wait for release of the activity and will definitely look at the activity before going to the lecture as stated by several participant:

*“Most of the students will look at the quiz before the lecture.”*

*“I will race through the questions (activity) as quickly as possible.”*

*“It made me to do slightly more….”*

*“I do the quiz and then I go to the lecture.”*

*“I would like the quiz as I will get more percentage then I have got while sitting in the class.”*

*“What we did, you go through the notes and answer those questions before actually teacher goes to those points.*

This indicates the students’ likeness towards the online activities and they eagerly waited for its release. Some of the students also mentioned that the availability of the online activities engaged them even after the lecture.

*“It is pretty good because it gives you the opportunity to do it second time as well.”*

*“I start doing it (online activity) after the lecture.*

These activities also helped students to engage more in the lecture as they will wait for the topic related to the questions in the online activities and carefully listen to it as it helped them to correctly answer the question as indicated by the following statement:

*“I think (teacher) does ask the question when he is writing on the board and exactly same question is in the quiz.”*

*“He (teacher) will give an example similar to what is in the quiz and then he will ask exactly the same question.”*

*“you are listening and then you know what he is talking about and when a question comes, you think back and answer it and get it right.”*

These activities also helped students making positive use of the devices to find the answers to the questions and contribute to their learning instead of using it for social networking, surfing the Internet, watching videos, and playing games. The students used mainly mobiles and laptops to complete the online activities. The most frequent positive comments were “google” and “find answers” as reported by the participants:

*“Most of the students will google the answers to the questions.”*

*“Most of the time I will start googling it.”*

When asked about if these online activities helped them at all? The response was affirmative and participants perceived it in different ways. Many of the students agreed that it helped to familiarize with the contents of the lecture:

*“The questions were good and if you answer the questions, you know that you understand the contents of the lecture and in that way it was good.”*

*“I familiarize myself with the contents of the lecture before the lecture.”*

*” I will find the answer from the slides”.*

*“Most of the time I will flick through the pages and it really works for this purpose. I familiarizes myself with the content of the lectures.”*

Another point raised was that this kind of online activity can be good for the revision as suggested by following comments:

*“So the approach he is doing now would be more appropriate if it were done after and say this is your revision quiz and do it at home.”*

*“The quiz set up at the moment is better as revision quiz as the contents are all in the lecture and if you are listening, you should be able to do the quiz without much trouble and without looking at the notes if you sit there and process the lecture.”*

One thing which came out as a result of this research was that such online activities can distract the students as they are doing the activities and listening to the lecturer at the same time. This multitasking makes it hard to focus on either.

*“I always get distracted by the discussion that what is he (lecturer) saying and my eyes are always are on the part and I should read this question.”*

*“I am afraid I am not a FPGA“.*

Here, FPGA is a device which well known for parallel computation.

**Attendance**

There was no clear outcome on the previously posed research question whether embedding online activities can increase the attendance in the classroom. Upon the question about lecture attendance, students’ responses were unequivocal that whether in class activities lured them to attend the lectures. The main reason behind attending the lectures cited by students were not just in class activities. There was a divide as some students thought that it did improve attendance whereas others did not agree with that statement. The teacher observed increased attendance compared to the last year but it is hard to relate this to the in class activities due to several other parameters involved such as increased number of students enrolling for course as compared to last year, lecture room location, timing and obviously new batch of students with better GPA etc.

When asked if there were no online activities and marks associated with them, would they come to lecture?

“Half the people would have not answered.”

“Everyone here pretty much would.”

“A number of students won’t come.”

“Definitely if you take away the incentive, attendance will drop.”

“It is the fear of losing marks (which brings me to the lecture).”

“No. It did not help me to go to the lecture. I did not say that it was not helpful at all. But, I do get the idea that which part I know and which part I do not know.”

Most of the students who participated in one of the discussion were those who were regularly attending the lecture and revealed that they attended all the lecture as they did not want to miss the contents of the lecture and were more likely to attend the lectures even if they are not interactive provided that contents are not boring.

“It is more about contents and that was the reason to attend the class rather than it is interactive.”

It seems that online activity “forced” some students to come the lecture they perceived this activity as a kind of measure to indirectly force students to attend the lecture as illustrated by the following comments:

“Online activity is just like a rollcall people don’t pay attention to it.”

“It seems that online activity aimed at getting a roll call. The question he (teacher) can ask is: are you present in the class? Yes or no. It is an indirect way.”

1. **Discussion**

This paper demonstrates results that have been obtained from our study into the use of embedded online activities to enhance the lecture attendance. While the findings are somewhat disappointing, a couple of interesting results emerged from this study. First, a large majority of students participated and completed the activities. This engaged them in the lectures and also prompted the use of digital devices for academic purposes, especially those addicted to mobile usage. If students are not engaged properly, they are easily distracted through the digital devices (Colb, 2006; Murray, 2011). However, the quality of engagement was regarded as lower level under the uncontrolled and unstructured environment. Beyond this, the findings indicates that online activities only is not the best way to engage the students effectively. Instead, students’ engagement can be enhanced by combining the online activities with student-teacher interaction for providing feedback and motivate the students (Fayombo, 2012).

This study also reveals that students have positive feeling about the online activities and integration of such technologies into their lectures. Therefore, there is a need to find innovative solution to help student with academic engagement and this is also supported by the literature (Stîngu & Iftimescu, 2016). As evident from student responses, student appreciate the online activities and see it as a positive addition to their learning. We can draw from the students’ comments that they thought it was an effective way to engage students in and outside the class and helped them to familiarize them with the contents and provided instant check on their understanding, especially for those that are normally reserved and unwilling to speak to teacher in front of their peers to get affirmation on their understanding. Another trend noted was that the completion rates of online activities were greater than attendance rates to passive. This means allowing online submission decreases class attendance. Furthermore, online activities also provided a way to get feedback on their understanding. We also observed a pattern that both physical presence in the class and online activity completion rates decreased as semester approached towards the end. As these online activities did not carry and significant marks, therefore, the instrumental students may be more likely to view them as unnecessary and place a low priority on attendance (Friedman, Rodriguez, & McComb, 2001; St. Clair, 1999). Furthermore, it can be deduced from the difference in attendance and online activity that some of the students will not bother to come the lectures if the online activities can be submitted outside the classroom. A close to 100% presence was achieved when a compulsory online activity was conducted inside the class. But, this attendance rate fell to around 61% when students came to know that it can be submitted online outside the lecture. A 39% drop was observed as result of it and it should be emphasized that all other variables were kept constant. This means that allowing online submission may decrease class attendance. We also observed a pattern that both physical presence in the class and online activity completion rates decreased as semester approached towards the end. As these online activities did not carry and significant marks, therefore, the instrumental students may be more likely to view them as unnecessary and place a low priority on attendance (Friedman et al., 2001; St. Clair, 1999).

The student also reported distraction which is accordance with studies from (Junco & Cotton, 2011; Rosen, 013) whose finding indicate that it gives rise to multitasking as students are listening to the lectures and doing activity at the same time and attending to two tasks simultaneously decreases our ability to perform either task effectively (Sweller, 1988).

On the other hand, students though that these activities were not interactive at all. In order to make them more beneficial, these activities should be made more interactive by allocating the time to do the activity during the lecture, discuss the result and provide feedback. This is not possible as it will reduce already limited lecturing time Bonwell (1991).

During the discussion some of the student highlighted the need of more examples during the lecture and also provide them with many examples to do at home just like the high school but teacher is not willing to do so. This shows that students are still in high school mode and it is taking them longer to make a successful transition to the university. This might be the result of pampering students in their initial years of study (Walbeek, 2004).

Also, students do not like to be engaged through trivial exercises and instead like to be a challenged when doing activities (Fayombo, 2012).

1. **Limitations**

One limitation of the current research is that it only takes into account one specific course with around 75 students and out of those only a limited number of students participated in the focus group. Another study of replication of the current research in different courses and a different student population may help to get a more general statement about the effect of online activities on student’s attendance.

Another limitation of the current study is the lack of concrete data from previous years for the comparison purpose.

It is difficult to separate a single factor in students’ choice to attend class. A wide variety of reason influence a student’s decision to attend the class. The importance of online activities as a factor may be limited. When making the decision to attend class, it is likely that other factors such as the contents of lectures, fear to miss the contents, assignment deadlines are more likely to have an impact on the attendance.

1. **Conclusions**

Although increasing attendance may not be a lofty goal, like improving critical thinking skills or increasing knowledge, it is nonetheless a basic and essential goal that undergraduate engineering course. It is well established fact that there is strong correlation between attendance and student performance. Therefore, it is clear that students will not learn if they do not attend the class or complete assignments. Our experiment suggests that embedded online activities may help achieve these goals because students can be engaged in the class and complete online activities and this increased attendance should result in better learning gains. Furthermore, it also boosted the educational use of the portable devices in the classroom.

This study clearly suggests that the path to student engagement is not about the type of activity but it is about creating a meaningful connection between students and the instructor – it’s all about connections. While the study did not find any significant relationship between online activities and attendance, it did yield some interesting insights into the importance of social presence of both other students and the instructor for any kind of activity.

**References**

Alija, S. (2013). How attendance affects the general success of the student. *International Journal of Academic Research in Business and Social Sciences, 3*(1), 168.

Beard, R. M., & Senior, I. J. (1980). *Motivating Students*: ERIC.

Bligh, D. A. (1998). *What's the Use of Lectures?* : Intellect books.

Bliss, J., & Ogborn, J. (1990). Students' reactions to undergraduate science: Laboratory and project work. *The student laboratory and the science curriculum. London: Routledge*, 383-398.

Bolles, R. C. (1975). *Theory of motivation*: HarperCollins Publishers.

Bonwell, C. C., & Eison, J. A. (1991). *Active Learning: Creating Excitement in the Classroom. 1991 ASHE-ERIC Higher Education Reports*: ERIC.

Bowen, K., & Pistilli, M. D. (2012). Student preferences for mobile app usage. *Research Bulletin)(Louisville, CO: EDUCAUSE Center for Applied Research, forthcoming), available from* [*http://www*](http://www)*. educause. edu/ecar*

Colb, S. (2006). Taking notes without a computer: How laptops distract from classroom learning. *Retrieved November, 18*, 2008.

Coxon, E., Jenkins, K., Marshall, J., & Massey, L. (1994). The politics of learning and teaching in Aotearoa-New Zealand. *Palmerston North, NZ: Dunmore Pressxton*

Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college: A meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research, 80*(2), 272-295.

Crook, C., Harrison, C., Farrington-Flint, L., Tomás, C., & Underwood, J. (2010). The impact of technology: Value-added classroom practice.

Dahlstrom, E., Brooks, D. C., & Bichsel, J. (2014). *The current ecosystem of learning management systems in higher education: Student, faculty, and IT perspectives*. Research report. Louisville, CO: ECAR, September 2014. Available from <http://www>. educause. edu/ecar. 2014 EDUCAUSE. CC by-nc-nd.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *science, 332*(6031), 862-864.

Dobbins, C., & Denton, P. (2017). MyWallMate: An Investigation into the use of Mobile Technology in Enhancing Student Engagement. *TechTrends*, 1-9.

Emerson, T. L., & Taylor, B. A. (2004). Comparing student achievement across experimental and lecture-oriented sections of a principles of microeconomics course. *Southern Economic Journal*, 672-693.

Fayombo, G. A. (2012). Active learning: Creating excitement and enhancing learning in a changing environment of the 21st century. *Mediterranean Journal of Social Sciences, 3*(16), 107-128.

Fayombo, G. A., Ogunkola, B. J., & Olaleye, Y. L. (2012). Cross Institutional Study of the Causes of Absenteeism among University Students in Barbados and Nigeria. *Journal of Educational and Developmental Psychology, 2*(1), 122.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410-8415.

Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education, 50*(3), 906-914.

Friedman, P., Rodriguez, F., & McComb, J. (2001). Why students do and do not attend classes: Myths and realities. *College Teaching, 49*(4), 124-133.

Fuh, J. C. C., & Paul, A. TUNING INTO GEN-Y LEARNERS: AN ENGAGEMENT CATALYST.

Fujita-Starck, P. J., & Thompson, J. A. (1994). The Effects of Motivation and Classroom Environment on the Satisfaction of Noncredit Continuing Education Students. AIR 1994 Annual Forum Paper.

Ghosh, S., & Renna, F. (2009). Using electronic response systems in economics classes. *Journal of Economic Education, 40*(4), 354-365.

Gump, S. E. (2006). Guess who’s (not) coming to class: Student attitudes as indicators of attendance. *Educational Studies, 32*(1), 39-46.

Hamann, K., & Wilson, B. M. (2003). Beyond search engines: Enhancing active learning using the internet. *Politics & Policy, 31*(3), 533-553.

Honore, S., & Schofield, C. (2010). Generation Y and learning. *Ashridge J*, 26-32.

Hull, C. L. (1943). The problem of intervening variables in molar behavior theory. *Psychological Review, 50*(3), 273.

Jones, S. E. (2007). Reflections on the lecture: outmoded medium or instrument of inspiration? *Journal of Further and Higher Education, 31*(4), 397-406.

Junco, R., & Cotten, S. R. (2011). Perceived academic effects of instant messaging use. *Computers & Education, 56*(2), 370-378.

Kandlbinder, P. (2010). How to teach Gen-Y undergraduates. *HERDSA News, 32*(2), 28-31.

Kassarnig, V., Bjerre-Nielsen, A., Mones, E., Lehmann, S., & Lassen, D. D. (2017). Class attendance, peer similarity, and academic performance in a large field study. *arXiv preprint arXiv:1702.01262*

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of instructional development, 10*(3), 2-10.

Khong, R. W., Dunn, J. S., Lim, C.-M., & Yap, W. S. (2016). Why do students attend lectures?: Exploring justifications for attendance among undergraduate students from a British university in Asia. *The Journal of Developing Areas, 50*(5), 497-506.

Kornhauser, Z. G. C., Paul, A. L., & Siedlecki, K. L. (2016). An Examination of Students' Use of Technology for Non-Academic Purposes in the College Classroom. *Journal of Teaching and Learning with Technology, 5*(1), 1-15.

Kozma, R. B., Belle, L. W., & Williams, G. W. (1978). *Instructional techniques in higher education*: Educational Technology.

Kraushaar, J. M., & Novak, D. C. (2010). Examining the affects of student multitasking with laptops during the lecture. *Journal of Information Systems Education, 21*(2), 241.

Krueger, R. A. (2014). *Focus groups: A practical guide for applied research*: Sage publications.

Law, K. M., Lee, V. C., & Yu, Y.-T. (2010). Learning motivation in e-learning facilitated computer programming courses. *Computers & Education, 55*(1), 218-228.

Lim, D. H. (2004). Cross cultural differences in online learning motivation. *Educational Media International, 41*(2), 163-175.

Mann, S., & Robinson, A. (2009). Boredom in the lecture theatre: An investigation into the contributors, moderators and outcomes of boredom amongst university students. *British Educational Research Journal, 35*(2), 243-258.

Massingham, P., & Herrington, T. (2006). Does attendance matter? An examination of student attitudes, participation, performance and attendance. *Journal of University Teaching and learning practice, 3*(2), 82-103.

McGarr, O. (2009). A review of podcasting in higher education: Its influence on the traditional lecture. *Australasian Journal of Educational Technology, 25*(3)

Murray, K. E. (2011). Let them use laptops: Debunking the assumptions underlying the debate over laptops in the classroom.

Nicholl, H., & Timmins, F. (2005). Programme‐related stressors among part‐time undergraduate nursing students. *Journal of Advanced Nursing, 50*(1), 93-100.

Nicholls, J. G., Cheung, P. C., Lauer, J., & Patashnick, M. (1989). Individual differences in academic motivation: Perceived ability, goals, beliefs, and values. *Learning and individual differences, 1*(1), 63-84.

O’Farrell, C. (2002). Enhancing student learning through assessment. *Dublin: Institute of Technology*

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223-231.

Pryor, J. H., Hurtado, S., DeAngelo, L. E., Blake, L. P., & Tran, S. (2010). *The American freshman: National norms fall 2009*: Univ of California Press.

Rodgers, J. R. (2001). A panel-data study of the effect of student attendance on university performance. *Australian Journal of Education, 45*(3), 284-295.

Rosen, L. D., Carrier, L. M., & Cheever, N. A. (2013). Facebook and texting made me do it: Media-induced task-switching while studying. *Computers in Human Behavior, 29*(3), 948-958.

Rothwell, P. (2016). Mobile moments: How modern students make learning their own. .

Saldaña, J. (2015). *The coding manual for qualitative researchers*: Sage.

St. Clair, K. L. (1999). A case against compulsory class attendance policies in higher education. *Innovative Higher Education, 23*(3), 171-180.

Stewart, D. W., & Shamdasani, P. N. (2014). *Focus groups: Theory and practice* (Vol. 20): Sage publications.

Stîngu, M., & Iftimescu, S. (2016). *CHANGING PEDAGOGY: THE USE OF TECHNOLOGY IN EDUCATIONAL SUPPORT PROGRAMS.* Paper presented at the The International Scientific Conference eLearning and Software for Education.

Stuart, J., & Rutherford, R. (1978). Medical student concentration during lectures. *The lancet, 312*(8088), 514-516.

Tormey, R., & Henchy, D. (2008). Re-imagining the traditional lecture: An action research approach to teaching student teachers to ‘do’philosophy. *Teaching in Higher Education, 13*(3), 303-314.

Trowler, P., & Trowler, V. (2010). Student engagement evidence summary: The Higher Education Academy.

Tuchman, B. W. (1979). *A distant mirror: The calamitous 14th century*: Ballantine Books.

Unissa, A., & Nagabhushan, P. (2017). Attendance in Class and Motivation to Study in an Engineering Course: Exploring their Associations and Gender Differences. *Journal of Engineering Education Transformations*

Walbeek, C. (2004). Does lecture attendance matter? Some observations from a first‐year economics course at the University of Cape Town. *South African Journal of Economics, 72*(4), 861-883.

Wilson, B. G. (2004). Designing e-learning environments for flexible activity and instruction. *Educational Technology Research and Development, 52*(4), 77-84.

Wilson, D. L., & Conyers, M. (2013). *Five big ideas for effective teaching: Connecting mind, brain, and education research to classroom practice*: Teachers College Press.

Witecki, G., & Nonnecke, B. (2015). Engagement in digital lecture halls: A study of student course engagement and mobile device use during lecture. *Journal of Information Technology Education: Research, 14*, 73-90.

Yamamoto, K. (2007). Banning laptops in the classroom: Is it worth the hassles? *Journal of Legal Education, 57*(4), 477-520.