Improving Student Focus and Active Learning: An Investigation into the Use of Lecture Breaks in Undergraduate Education

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ABSTRACT

While teaching, we regularly delivered long lectures to our students. However, we found that this approach led to decreased attention and concentration. We noticed a decline in student engagement and participation during long, uninterrupted lectures. Keeping the students engaged during long lectures is a common challenge. According to Gibbs and Habeshaw, extended lectures can lead to fatigue and disengagement among students, making it difficult for them to absorb and retain information effectively. To address this, we started incorporating short breaks within our long, continuous lectures, which could help our students manage their cognitive load, allowing them to process and retain information more effectively. Therefore, we included five-minute lecture breaks in between the continuous lectures. We noticed that this approach resulted in more attentive and engaged students. The feedback from the students also indicated a positive response to this change.

Keywords: Continuous lectures, lecture breaks, active learning, higher education, student engagement

INTRODUCTION

During our teaching, we have noticed that our students start energetic and engaged, but their enthusiasm decreases as the lecture progresses. They all sometimes seem tired, which can lead to a loss of concentration during the lectures. In terms of participation, they also became less likely to ask questions and contribute to discussions. One of the major reasons behind this is the continuous lectures without any breaks. While a cornerstone of higher education, the traditional lecture format presents several challenges to efficient learning. In contrast to active learning methods such as student participation and engagement, traditional lectures somewhat position students in a passive role. Active learning is significant because it enhances student involvement, inspires critical thinking, and promotes knowledge retention, a stark contrast to the deficiencies of passive learning methods.

One of the significant limitations of long, uninterrupted lectures is the decline in students' attention span. People cannot remain attentive for a long time for passive activities like listening to lectures or reading textbooks. After approximately 15 minutes, engagement and effective note-taking decreased, resulting in poorer recall of information from the latter part of the lecture compared to the beginning. This phenomenon is illustrated in Figure 1, derived from the book "Preparing to teach: An introduction to effective teaching in higher education." (Gibbs & Habeshaw, Powerful ideas in teaching, 2011), which visually represents students' performance levels over time concerning their attention and engagement during lectures.

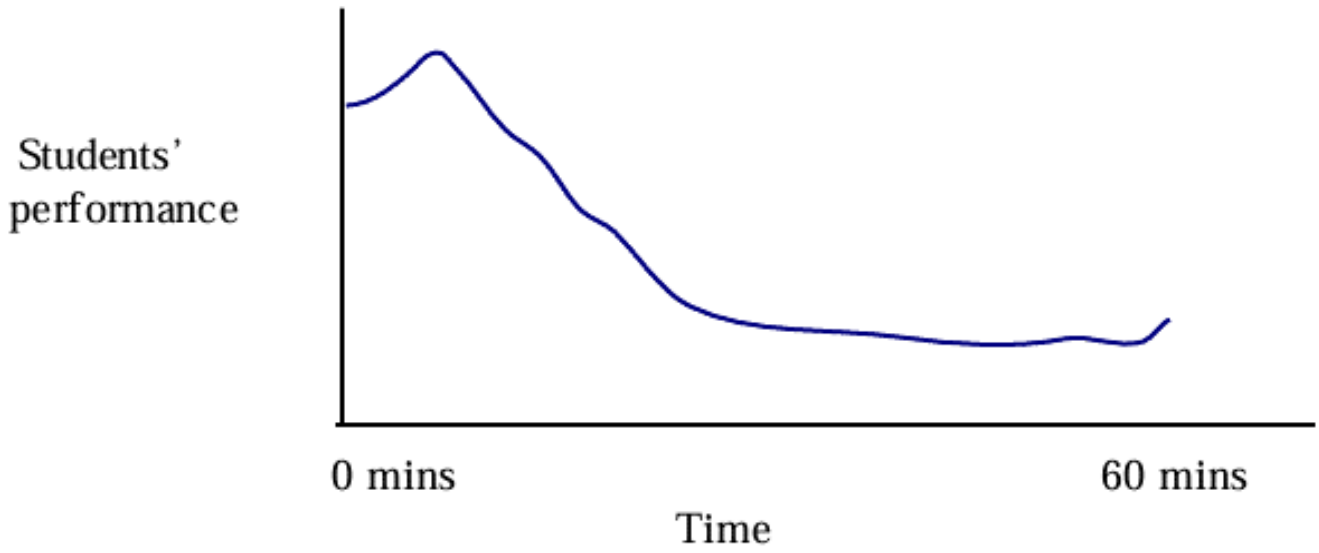

Figure 1. Students' performance over time

To restore learners' performance levels, you can give them a short rest by stopping the lectures. This break can temporarily improve performance, but the recovery often diminishes quickly, and each attempt to restore performance becomes less effective over time. This result supports Cognitive Load Theory, assuming our working memory has limited capacity (Sweller, 1988). Extensive periods of passive learning can overstretch this ability, disrupting the successful processing and memory storage of information. Breaks between lectures can contribute to managing cognitive load so that students are better able to process information.

People learn better when actively engaged rather than passively for extended periods. Breaking a lecture into three 15-minute segments with two 5-minute breaks or activities is often more effective than a single 55-minute session (Gibbs & Habeshaw, Lecturing, 2011). The issue of maintaining students' interest amidst long lectures is a common problem in higher education. Gibbs and Habeshaw (Gibbs & Habeshaw, Powerful ideas in teaching, 2011) note that long lectures create fatigue and a lack of engagement among students, making them incapable of properly absorbing and retaining information. This issue identifies the need for effective teaching approaches that can overcome these impacts and enhance students' learning outcomes.

Additionally, we related our situation to our experiences as students, recalling how difficult it was to stay focused during long, uninterrupted lectures, regardless of the subject matter. This personal reflection increased our empathy towards our students' challenges, strengthening the idea that the traditional lecture format might need adjustments.

The feedback we have collected from the students supports these concepts. Two distinct student groups from different disciplines were selected: first-year Computer Science students and third-year Languages and Communication Studies students, since we were actively teaching these batches and had direct engagement with them for the survey. The student feedback survey on continuous lectures without breaks from both batches is presented below:

From first-year Computer Science students

The feedback survey on continuous lectures without breaks from first-year Computer Science students revealed mixed opinions regarding lecture duration. Of 85 students, 59 responded to the feedback on "continuous lectures." While 44.1% of students found the lecture duration without a break difficult and 35.6% considered it manageable, 20.3% remained neutral, which is shown in Figure 2. This suggests that a significant portion of students did not find the format particularly challenging but were not entirely comfortable with it either.

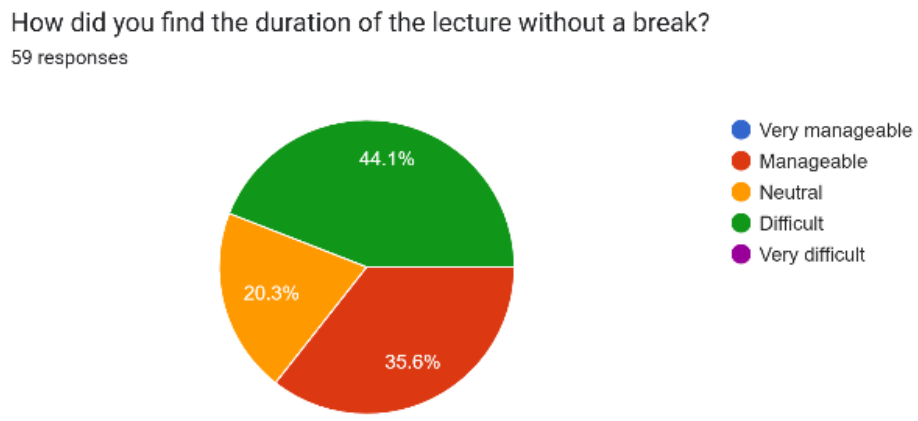

Figure 2. Perception of lecture duration without a break

Regarding the focus shown in Figure 3, 20.3% of students reported a very positive impact from the lack of breaks, while 61% viewed it negatively, and 18.6% remained neutral. This indicates that although the majority did not find the absence of breaks problematic, a portion of students may not have experienced optimal engagement.

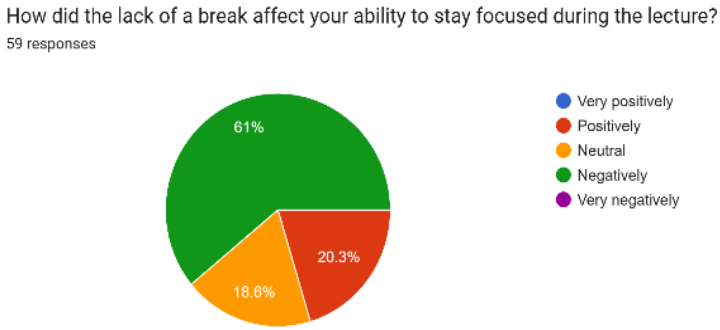

Figure 3. Impact of no break on focus during the lecture

Figure 4 shows that regarding the pace of the lecture without breaks, only 18.6% felt it was comfortable, while 30.5% believed it was too fast. A notable 42.4% found the lecture too slow, and 8.5% remained neutral. This suggests that the absence of breaks may have contributed to a perception of a slower pace, potentially affecting student engagement.

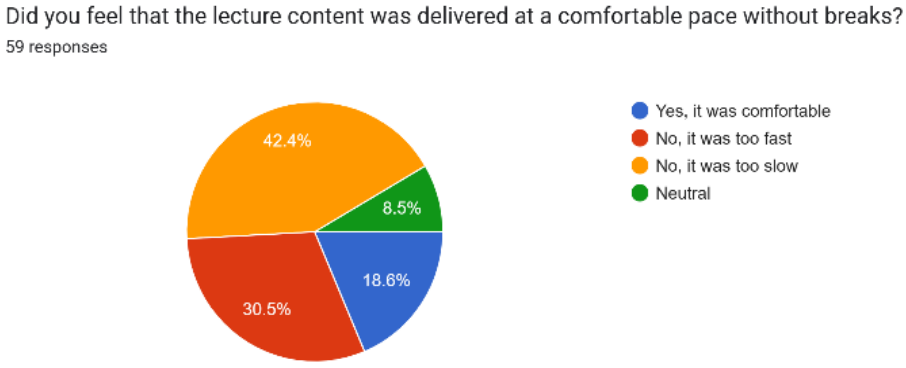

Figure 4. Perception of lecture pace without breaks

In terms of participation and engagement from Figure 5, 18.6% rated it high, while 44.1% reported low engagement. However, 35.6% were neutral, indicating that while many students remained actively engaged, others may have struggled to maintain focus throughout the lecture.

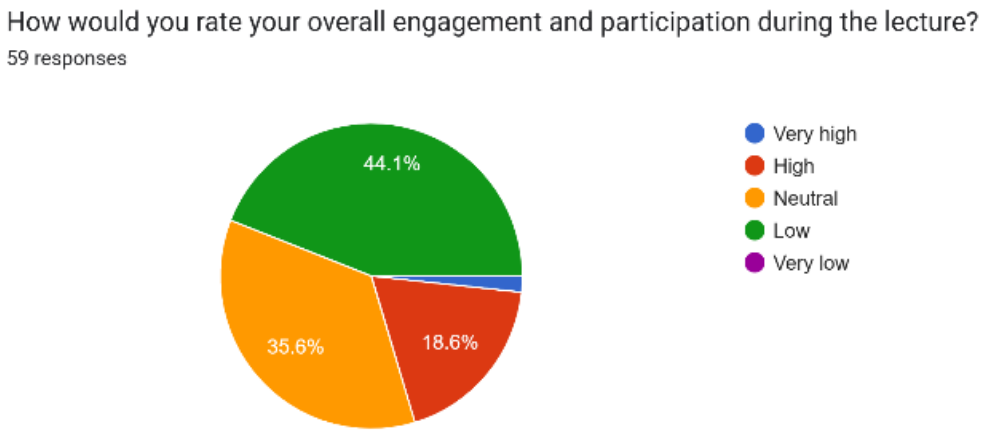

Figure 5. Overall engagement and participation in the lecture

As shown in Figure 6, a strong majority (93.2%) expressed a preference for including short breaks in long lectures, reinforcing the idea that most students believe breaks would enhance their learning experience.

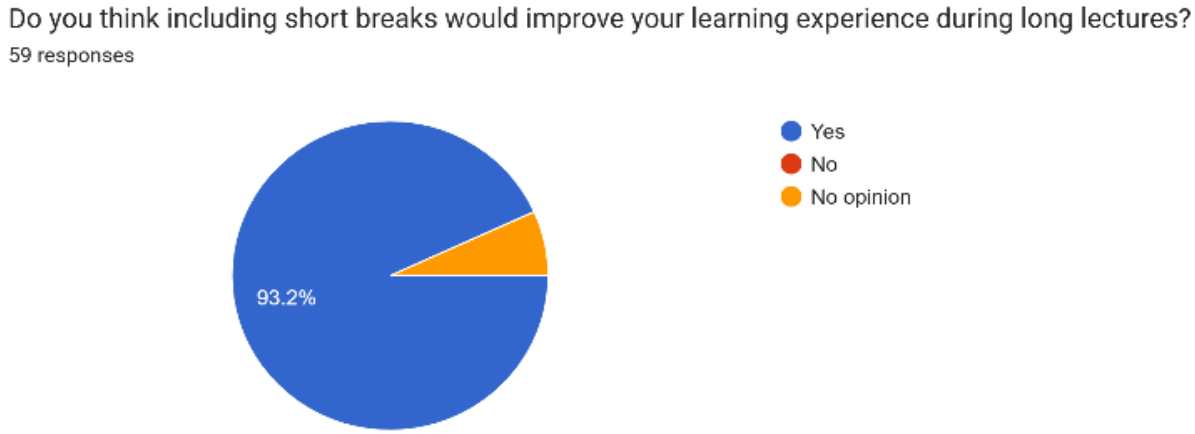

Figure 6. Impact of including short breaks on the learning experience

Further, in the open-ended suggestions, students overwhelmingly recommended incorporating breaks, suggesting that doing so would improve attention and retention during lectures. Overall, while some students managed well without breaks, many found it difficult to stay engaged and preferred a structured lecture break system to improve focus and learning outcomes.

From third-year Languages and Communication Studies students

The feedback from the third-year students of Languages and Communication Studies on continuous lectures without breaks reveals that the majority found them challenging based on 87 responses. Figure 7 illustrates students' ability to pay attention and actively participate during continuous lecturing. A significant majority, 85.1%, reported that they struggle to stay engaged, while only 14.9% indicated they could maintain focus and participation. This suggests that continuous lecturing may not be the most effective teaching method for sustaining student attention and engagement.

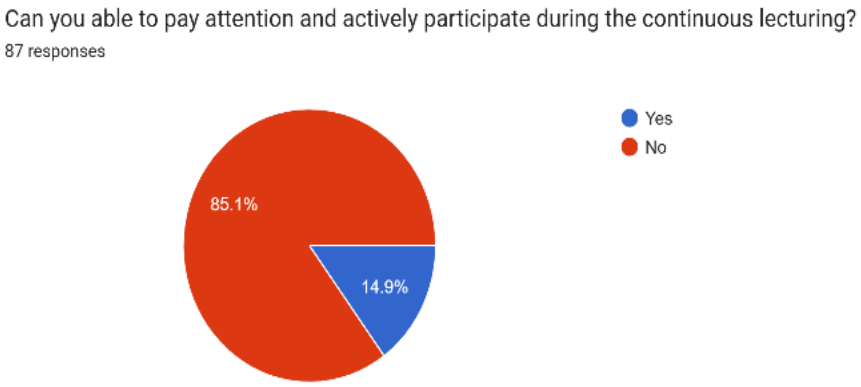

Figure 7. Ability to maintain attention and participation during continuous lectures

Further, many students described the lectures as "boring," "difficult," and "tiring," with several mentioning that it was hard to concentrate for extended periods in the open-ended discussion. Some students explicitly stated that continuous lectures made it difficult to pay attention, leading to feelings of frustration and disengagement.

Several students suggested that including short breaks would improve their ability to stay engaged and absorb information more effectively. Some also noted that continuous lectures made them feel sleepy, while others said they struggled to retain information. Overall, the feedback strongly indicates that implementing breaks in long lectures could significantly enhance students' learning experience and attention span. Therefore, we have decided to incorporate lecture breaks into our teaching.

Objectives

To investigate the impact of short lecture breaks on undergraduate students' attention and interest in lectures.

To determine if lecture breaks would enhance active learning and participation by undergraduate students.

For assessing the students' perceptions of the use of lecture breaks in their learning process.

Research Questions

In what ways does the use of short lecture breaks affect undergraduate students' levels of attention during lectures?

What is the effect of incorporating breaks during lectures on the active participation and engagement of students in the learning process?

What are the views of undergraduate students on the impact of lecture breaks on their general learning experience and performance?

Statement of the Problem

The lecturer's quest to secure the students' attention and achieve effective learning in a typical lengthy lecture of higher education is an uphill battle. It requires innovativeness to 'design' strategies and methods that would deal with this complexity. Learning context changes demand immediate pedagogical change as expressed in low student motivation, attention, and information retention.

LITERATURE REVIEW

The study (Fenesi, Lucibello, Kim, & Heisz, 2018) looked at how exercise breaks affected university students' ability to focus and learn. One set of participants played a computer game during their breaks, another group had

exercise breaks, while a control group did not take any breaks. The students were arranged into three groups: one receiving exercise breaks, one playing a computer game during breaks, and one without breaks. The study used immediate and delayed exams to assess learning and mind-wandering questions to gauge attention during a 50-minute video presentation that included three 5-minute breaks. The exercise break groups outperformed the remaining groups on learning tests and displayed greater on-task attention, according to the results. Additionally, the participants from the exercise group rated the lecturer as clearer and the material to be more learnable. All these findings support that the insertion of short periods of physical exercise breaks into lectures at universities could enhance students' performance and learning.

The "Broken Lecture" described in this study (Nayak, 2006) is a new teaching approach to boost the enthusiasm of first-year medical students for lectures. Rather than presenting the typical, unbroken 1-hour lecture, the lecture is split into three 15-minute lecture blocks. There are organized 5-minute self-study practice exercises after every segment. During these 5-minute intervals, a PowerPoint slide presentation is displayed, and pictures regarding the human body as well as questions are given. Students are encouraged to pose questions among themselves and refer to textbooks for answers. The questions are typically concerning the next lecture section or upcoming topics. The goal of this approach is to maintain student attention, encourage active learning, and foster peer interaction. According to student feedback, the method made lectures more interesting, enjoyable, and thought-provoking. The "Broken Lecture" method is described as a student-friendly and student-centered approach that could be applied to other subjects, such as biochemistry and physiology, with slight modifications.

The study (Harris, Buglass, & Gous, 2021) tested the impact of lecture chunking on university students' attention. Researchers compared the impact of delivering an asynchronous lecture in a single long video versus multiple short video clips. Fifty-one postgraduate psychology students participated, choosing their preferred option. Outcomes revealed that students who saw shorter video clips perceived higher learnability of learning objectives, had fewer lapses of attention, and followed recommended breaks more. The duration of attention lapse did not significantly vary between groups. Taking breaks was identified as the strongest predictor of minimizing lapses of attention by regression analysis. The findings suggest that segmented online lectures broken into small pieces boost prolonged focus by eliciting natural break-taking, lowering cognitive load, and raising engagement.

(Miller, McNear, & Metz, 2013) compared traditional and interactive lecture methods in a large, professional-level course in this study. Five systems of physiology were covered using traditional lecture methods, and six systems of physiology were covered using interactive lecture methods in the same group of 120 first-year School of Dentistry DMD students. The interactive lectures involved 10-15 minutes of lecture followed by subsequent activities, including problem-solving, case studies, and group work. The authors then contrasted student performance and survey outcomes between the two lecture techniques. The authors determined that involving lectures led to statistically significant improvements in student performance and long-term retention, more perceived effectiveness of lectures, reduced distractions, and greater student confidence. The authors suggest that professional schools adopt engaging lectures and active learning to promote improved student outcomes.

(Ruhl, Hughes, & Schloss, 1987) investigated the effect of the implementation of a pausing procedure during lectures on students' free recall post-test and overall test performance. The researchers employed a study of 72 special education undergraduate students. The research compared a pause procedure applied in lectures (experimental) with lectures where there was no pause procedure applied (control). The pause strategy was executed through the placement of three 2-minute breaks every 45 minutes of lecture time, and student discussion of lecture content took place in dyads during pause breaks. Free-recall examinations followed each lecture, and a major multiple-choice test was given 12 days following the last lecture. The results indicated that students in the experimental group who received the pause procedure did better on free recall tests and the overall objective test compared to the control group. Overall, the research indicated that use of the pause procedure in lectures increased students' immediate recall and retention of lecture material.

In their article, Eze and (Eze & Edward, 2017) researched the impact of lecture duration on learning and instruction in universities based on the hypothesis that human attention span is limited. The authors reviewed earlier literature and theories of attention, such as Capacity Theories of Attention and Bottleneck Attention Theory, which assume that human beings have limited attention spans and that they are endowed with an inherent mental filter. They argued against the practice of long lecture durations, such as three-hour sessions, citing

research indicating that attention spans can be as short as 8 seconds to 5 minutes, and that students' attention tends to wane after 10 to 15 minutes. The authors argued that longer durations of lectures were guaranteed to have negative impacts on learning and teaching via mental overload, decreased retention, and class time management and attendance. They called for increased empirical research and curriculum design re-alignment to be in line with the students' attention span and maximize instructional and learning achievement.

(Butze, Hibbard, & Hernandez, 2021) found the impact of breaks on the participation and engagement of students in workshops. They opined that introducing breaks would maximize participation and engagement. To see if this was the case, they inserted five-minute content brain breaks made up of conversation starters following problem-solving activities into a first-year first-semester chemistry workshop. Students were required to fill in three-week surveys of participation and engagement. The conclusion emphasized a relationship between the students' readiness to engage and the breaks. The authors concluded that offering breaks in between the problem-solving activities provided a more holistic and effective workshop setting.

METHODOLOGY

This study employed a mixed-methods approach, combining quantitative and qualitative methods of data collection to provide a comprehensive explanation of the impact of lecture breaks on student learning achievement and engagement.

Participants

The study participants comprised two distinct student groups from different disciplines within the Trincomalee Campus, Eastern University, Sri Lanka.

Group 1: First-year students of Computer Science enrolled in the System Analysis and Design course during the second semester. This group consisted of approximately 85 students.

Group 2: Third-year students of Languages and Communication Studies enrolled in the Desktop Publishing course during the first semester. This group consisted of approximately 110 students.

These groups were chosen based on our direct teaching interaction with and exposure to them, allowing for firsthand observation and data.

Intervention

The intervention involved the incorporation of brief lecture breaks in the normal lecture mode. The structure and duration of the breaks were not the same for the two groups but rather provided for adjustment for the difference between their respective class schedules and lengths of lectures.

Group 1 (First-year Computer Science): All lectures of two hours had three five-minute breaks placed after every block of uninterrupted lectures of thirty minutes.

Group 2 (Third-year Languages and Communication Studies): Each one-hour lecture included two breaks, each lasting five minutes, added after 15 minutes of continuous lectures.

During breaks, students were accommodated with relaxed activities such as conversation with friends and taking short rest, with the purpose of providing mental and physical refreshment.

Data Collection

Data was collected through a combination of observations and student feedback surveys.

Observation: Students' engagement levels, participation and behaviours were observed during the lectures to evaluate the changes in their participation and attention throughout this intervention.

Student feedback surveys: At the end of this intervention, after one month, both student groups were asked to submit feedback surveys to collect their perceptions and experiences of having lecture break implementation. This survey included closed-ended questions, which are a multiple-choice question format for assessing various aspects of their learning experiences, such as engagement, attention towards lectures, participation, and effectiveness of lecture breaks. Additionally, the students were provided an open-ended forum to express their comments as well.

RESULTS AND DISCUSSION

This section presents the findings from the collected feedback surveys and observations, which detail the impact and effectiveness of including short lecture breaks in continuous lectures. The feedback was gathered separately from each student group.

Results

First-year Computer Science students

The feedback received from the first-year Computer Science students showed a positive reception to the use of lecture breaks.

Most students found lecture breaks beneficial, improving focus, participation, and engagement. The majority of students found the breaks during lectures to be beneficial, with 62.8% rating them as beneficial and 32.6% as very beneficial, as shown in Figure 8.

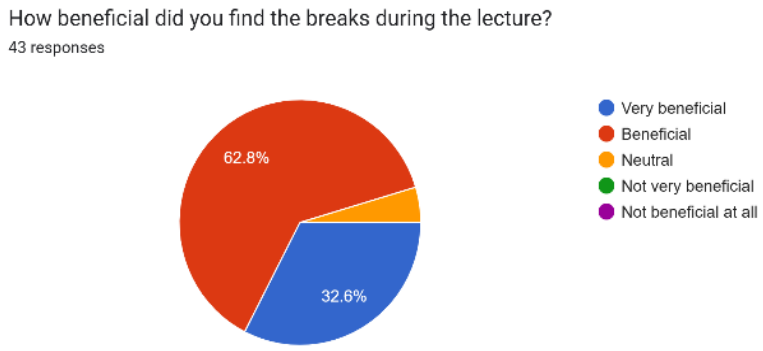

Figure 8. Feedback on the effectiveness of lecture breaks for enhancing learning

Figure 9 shows that 69.6% reported a fair improvement regarding focus and engagement, while 30.4% noted some great improvement.

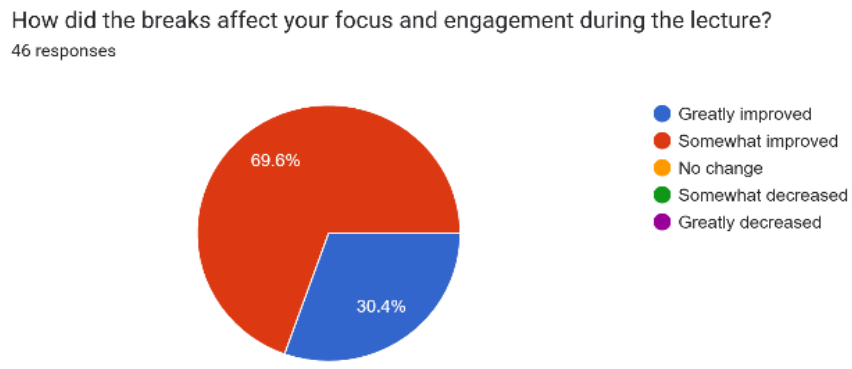

Figure 9. Feedback regarding focus and engagement

In terms of overall participation, as shown in Figure 10, 30.4% saw some improvement, and 63% reported a significant improvement.

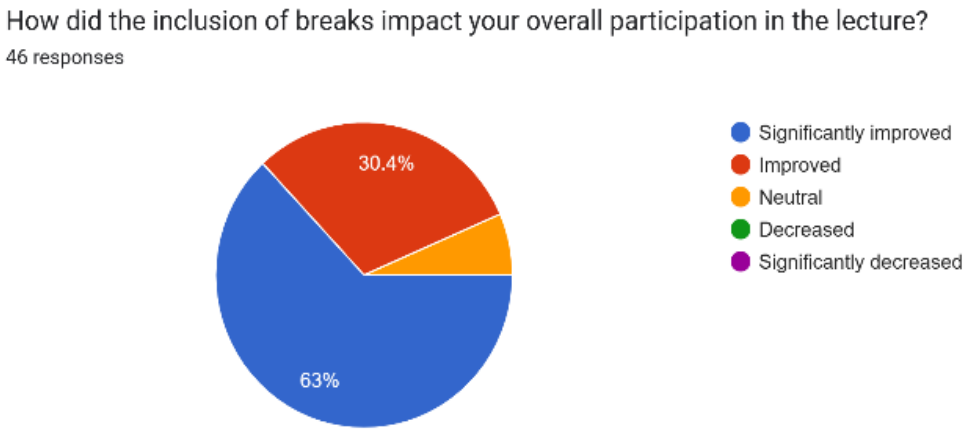

Figure 10. Feedback for overall participation

Additionally, Figure 11 shows that 65.2% strongly agreed that breaks helped them feel refreshed and ready to engage, while 28.3% agreed. The open-ended responses further supported these findings. Students frequently mentioned that the breaks helped them to "clear their minds," "stay focused," and "participate more actively" in class discussions. Some students suggested that the break time should be extended.

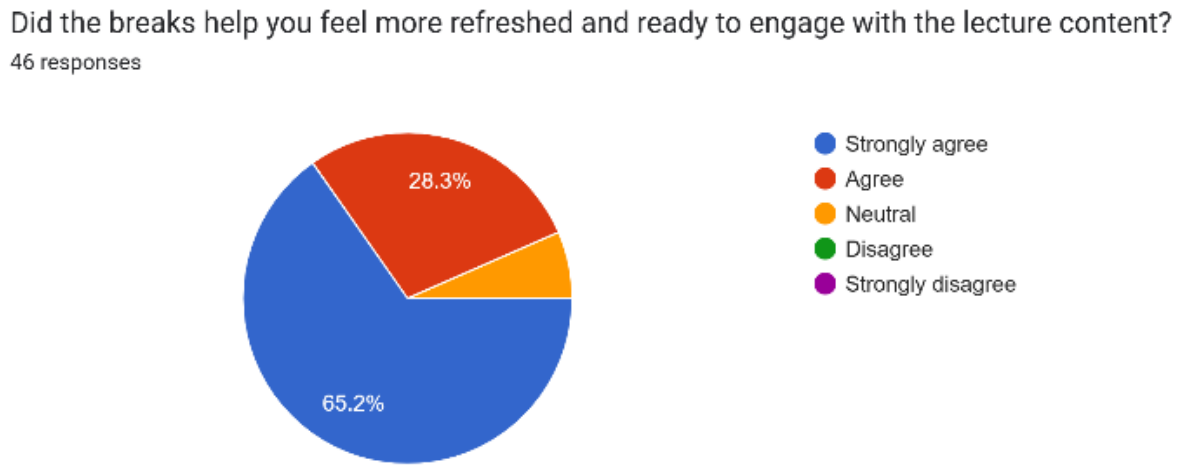

Figure 11. Feedback on whether breaks helped them feel refreshed and engaged

Overall, the feedback from the first-year Computer Science students suggests that the introduction of lecture breaks was associated with increased student focus, engagement, and participation.

Third-year Languages and Communication Studies Students

The feedback survey gathered from third-year students from Languages and Communication Studies also indicated a positive response to the effectiveness of lecture breaks in continuous sessions.

The results shown in Figure 12 indicate that most students perceive these breaks positively. Specifically, 42% found the breaks good, while 53.1% rated them as effective. A smaller percentage considered them "not bad" or "not effective," suggesting that the majority saw value in having breaks during lectures.

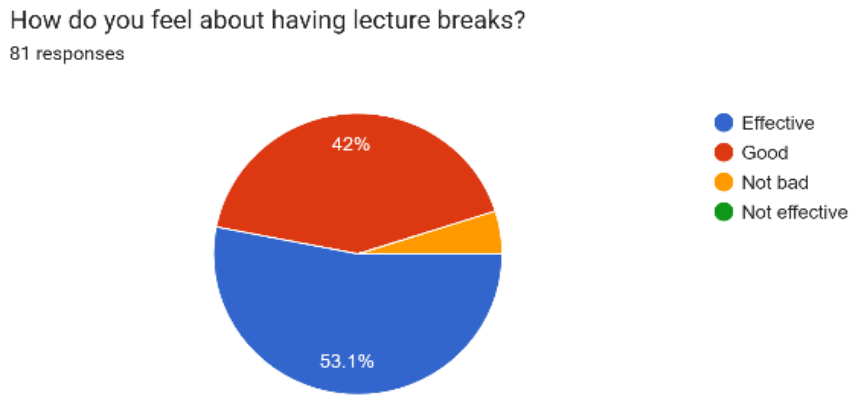

Figure 12. Feedback on the effectiveness of lecture breaks

When asked about their ability to pay attention during continuous lectures with breaks, 80.2% of students responded positively, indicating that breaks help maintain focus. Another 18.5% said "maybe," suggesting some uncertainty, while only a small percentage found them unhelpful, which is shown in Figure 13.

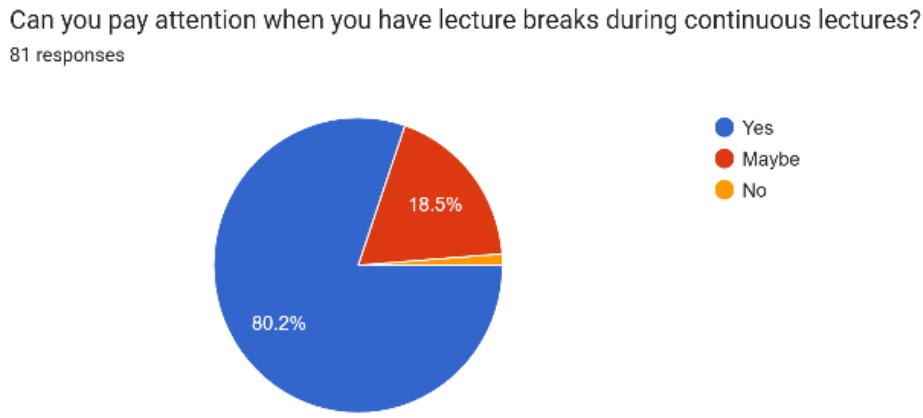

Figure 13. Effect of lecture breaks on students' attention

Similarly, Figure 14 describes that when questioned about their ability to actively participate, 87.7% confirmed that breaks improved their engagement, and 12.3% were unsure, but no students outright rejected the idea.

Figure 14. Feedback on active participation with lecture breaks

Figure 15 depicts the final question asked, whether students would like to continue using this method of incorporating breaks into lectures, and an overwhelming 98.8% responded "yes." This strong endorsement suggests that students believe breaks enhance their learning experience, helping them stay focused and engaged throughout the session.

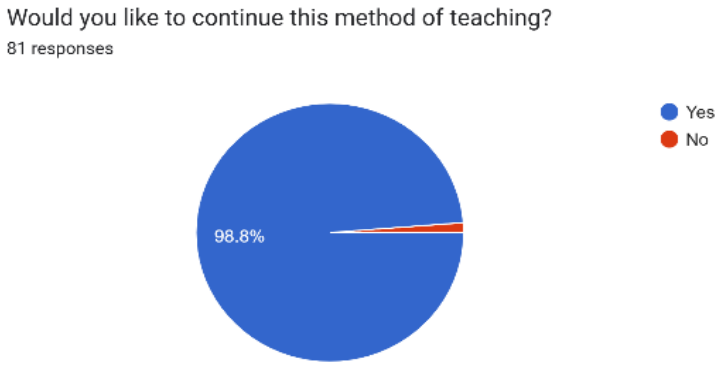

Figure 15. Feedback on preference for lecture breaks in teaching

Further, the students revealed that they felt more "refreshed" and "less tired" during lectures with breaks in the open-ended discussion. These results indicate that the third-year Languages and Communication Studies students also experienced enhanced focus, engagement, and participation due to the implementation of lecture breaks.

DISCUSSION

The findings from both student groups suggest that lecture breaks enhance focus, participation, and overall learning experience, making them a valuable practice in student-centered teaching and active learning.

Increased Participation and Engagement: The results validate a significant trend of increased student participation and engagement following the implementation of lecture breaks. This is also attested to by the large proportion of students from both groups who concurred that their focus was enhanced, they engaged more actively, and they felt re-energized.

Improved Focus and Attention: The results indicate that breaks within lectures assist in attaining greater focus and attention among students. This could be because the breaks enable students to momentarily disengage from the lecture, reduce cognitive load, and allow for mental restoration. This could be aligned with Cognitive Load Theory, which describes that dividing the learning process can assist with the processing and retention of information.

Consistency Across Disciplines: It should be mentioned that the positive effects of lecture breaks were observed in two diverse disciplines (Computer Science and Languages and Communication Studies). It is feasible, therefore, that the advantage of this intervention may be transferable to other undergraduate student groups.

Practical Implications: The findings have practical implications for the study of higher education lecturers. The findings suggest that incorporating regular short breaks into the lectures can be an effective way to enhance student interest, engagement, and participation.

Further, the classroom observations showed an increased interaction among students during and after the breaks. The students were also engaging in conversations with their peers, stretching, relaxing, as well taking short breaks from the lecture materials. These observations provide additional evidence for the impact and effectiveness of incorporating lecture breaks. Overall, the results obtained from this study provide strong evidence for the benefit of incorporating lecture breaks in undergraduate lectures. The results illustrate the success of the intervention in improving students' engagement, focus, and overall learning process.

CONCLUSION

Incorporating short breaks into continuous lectures seemed to bring a positive adjustment to the students' behaviour. The breaks allowed the students to refresh their minds and bodies, enabling them to return to the material with renewed focus and energy. We could observe this by their increased and active participation in the lectures after the breaks. This was further evidenced by the feedback we collected after instituting the breaks. The feedback from students was positive, indicating that they found the breaks helpful in maintaining their concentration. By comparing the feedback received from the students before and after the implementation, almost everyone found it very effective and expressed a desire to continue this in the future to enhance an active learning environment. To make the class more engaging, we plan to incorporate motivational videos, quick relaxing games, and in-class exercises within the lecture breaks that will boost student happiness and energy in the future.

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