"*Giving students a voice: evidence to have facilitated student voice generation through teaching*"

Proceedings of the 20th Annual SLAIHEE Conference on Higher Education in Sri Lanka

organised by

Sri Lanka Association for Improving Higher Education Effectiveness (SLAIHEE)

supported by Informatics Institute of Technology (IIT)

Friday, 26 July 2024

9.00 a.m. to 4.30 p.m.

held at

Informatics Institute of Technology (IIT),

Spencer Building, Colombo 03

DEDICATION

Dedicated to the ever-reminiscent memory of Dr Shrinika Weerakoon

BSc, MSc, MBA(Perth), DBA (Bath, UK), SEDA Accredited Teacher, ASTHE

- an irreplaceable Higher Educational Developer
- a colleague, a friend, a guide, a change agent: who always found time to be there for you
- who epitomised a life that: “what you leave behind is not what is engraved in stone monuments, but what is woven into the lives of others" (Pericles)

and

- in whose memory SLAIHEE has instituted an annual Award:
  "Dr Shrinika Weerakoon Memorial Award for the Best Paper in Changing HE student skills”

SLAIHEE Conference 2024

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20th SLAIHEE Higher Education Conference

on

"***Giving students a voice:***
evidence to have facilitated student voice generation through teaching"
Friday, 26 July 2024, 9.00 a.m. to 4.00 p.m., held at Informatics Institute of Technology**,**
School of Computing, Spencer building, Colombo 4

(the materials of this conference are available at www.slaihee.org)

A WARM WELCOME TO THE CONFERENCE

This is the twentieth year since SLAIHEE was established as a non-profit voluntary organisation. From its establishment in 2005, SLAIHEE (Sri Lanka Association for Improving Higher Education Effectiveness) has organised an annual conference, taking pleasure to provide the only opportunity in Sri Lanka for our university staff to document and discuss the learning enhancements that they have been able to achieve through their subject-related teaching. For the first eleven years, the Staff Development Centre (SDC) at the University of Colombo was the organisational partner hosting this annual conference. Then, in its 12th year, the SLAIHEE-SDC conference was hosted by the Staff Development Centre, Wayamba University of Sri Lanka and in the 13th year, was hosted by the Open University of Sri Lanka. 14th year, the host became a private HEI, the Sri Lanka Technological Campus with its newly established Centre of Excellence in Teaching, Learning & Innovation (CETLI). The 15th conference was hosted by the Staff Development Centre, Moratuwa University of Sri Lanka. The 16th, 17th and 18th conferences were held online via Zoom due to the COVID-19 pandemic-related restrictions. From last year SLAIHEE resumed the face-to-face format for the annual conference. The conference this year is supported by the Informatics Institute of Technology (IIT), a private HE provider and its Academy for Learning & Teaching Effectiveness Facilitation (ALTEF).

This conference has become a Community of Practice and the only national conference in Sri Lanka that focuses exclusively on learning and teaching in the Higher Education (HE) context (SoTL, Scholarship of Teaching and Learning). This year's conference celebrates the twentieth year of SLAIHEE and over 25 years since the first SDC was established in Sri Lanka (at University of Colombo). Such a 25-year history gives us the opportunity to look back and use that experience to question our 'maturity' and where we are, specially with the untimely death of Dr Shrinika Weerakoon who stood, with immense credibility among academics, at the forefront of HE change and improvement in Sri Lanka. She played her role excellently and moved on, much to our disbelief and sorrow. What we will have to say, and do, over the next ten to twenty years is now up to you all and to SLAIHEE. As pioneers in striving to maintain the quality enhancement of HE in Sri Lanka, SLAIHEE has faced and traversed huge challenges and our simple beginnings have enabled us to face these. What challenges the future holds are already palpable, specially with a change in training quality offered at SDC's of many Universities. It is therefore noteworthy that ALTEF is progressing with plans to make its courses accredited with the UK Advance Higher Education (Advance HE, formerly: Higher Education Academy).

This year's conference theme, *"Giving students a voice: evidence to have facilitated student voice generation through teaching"* (for previous conference themes and proceedings, see:

www.slaihee.org) is relevant because the quality of HE teaching, as well as the quality of training programmes for HE teachers, seem to be severely challenged at present. After 'opening' the submission of abstracts / papers on this theme, most submitted material failed to align with the concept of "student voice generation" in their HE classrooms. It appeared as if lecturers had scarcely given thought to 'student voices' in their classrooms so that only a low number of papers were acceptable on this conference theme, after being reviewed. This, however, showed SLAIHEE the need to hold a post-conference workshop this year.

The main theme *"Giving students a voice …"* is the cornerstone if the ever-present problem of "students not engaging" and "students not learning (enough)"is to be addressed. It is from this theme that it becomes possible to give students an identity and ownership in the classroom, for students to move away from classroom boredom, nonengagement and if they are expected to build their motivation, curiosity and skills such as critical thinking.

Over their school lives and through university life, most students have experienced classes that have been teacher controlled and teacher-led. Therefore, students could be 'programmed" to have become very reluctant individuals to *"Give voice"* to their viewpoints and opinions or to question teachers even when clarity is lacking. For those who are now teachers and lecturers, their university courses had most probably been of the teacher-led genre, so that teachers require 'de-programming' training if they are to change lesson delivery they had continuously seen, heard and had experienced.

Therefore, the papers presented on this conference theme are significant to show conference attendees how, when lecturers receive effective targeted training and support, they will rise to the occasion to develop the much-needed voicing skill in our HE students.

We take great pleasure in welcoming you, and our Keynote speaker, Professor Suki Ekaratne, Founder-President of SLAIHEE, Founder-Director of Sri Lanka's first SDC and Founder-Director, Academy for Learning & Teaching Effectiveness Facilitation at the Informatics Institute of Technology (ALTEF @ IIT). The conference is of particular interest to all those with a concern and commitment to the quality and fate of future Higher Education in Sri Lanka, including; lecturers, managers and administrators in Higher Education, educational and staff developers, and policy makers

We hope you have an extremely enjoyable experience that will motivate all of us to enhance the quality and usefulness of the higher education experience, mainly to our students.

From SLAIHEE – a big thank you;

- for your participation,
- to the presenters for reporting how they facilitated student voice generation through their teaching to enhance the teaching learning experience in their classrooms while addressing the challenges faced by both HE teachers and students in the 21st Century,
- specially to Professor Suki Ekaratne, for the Keynote speech and his services to HE,
- to all the special invitees, and to the reviewers for their speedy reviews with helpful feedback.

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Dr Jinendra Dissanayake, University of Colombo

PROGRAMME

Conference Theme: ***Giving students a voice: evidence to have facilitated student voice generation through teaching***

08:30 – 08:55	:	**Registration**
Inauguration		
09:00 – 09:05	:	Conference Announcement by Prof Sunethra Perera Past President, SLAIHEE
09:05 – 09:10	:	Welcome address by Dr Iroja Caldera, President, SLAIHEE
09:10 – 09:35	:	Inauguration of Academy for Learning and Teaching Effectiveness Facilitation (ALTEF) at the Informatics Institute of Technology Address by Guest of Honour: Mr Mohan Fernando, CEO of Informatics Group of Companies
09:35 – 10:10	:	Keynote Address by Prof Suki Ekaratne, Director/ALTEF and Founder President/SLAIHEE
10:10 – 10:20	:	Dr Shrinika Weerakoon Memorial Award - Explanatory Comments - Awards presentation - for the best Paper/s, 2023 Conference
10.20 – 10.25	:	Vote of Thanks by Dr Jinendra Dissanayake, President Elect, SLAIHEE
10.30 – 11.05	:	**Morning Tea** (with Networking – in cafeteria, Floor 8)
Paper Presentations with 'Best Paper' selection [Session 1 & Session 2]		
11.15 – 12:15	:	Session 1: Chair - Dr Ruwani Mayakaduwa (Room 7LA) Session 2: Chair - Ms Sapna Atapattu (Room 7LB)
12:20 – 13.25	:	Non-Members: **L u n c h** (in Cafeteria, Floor 8) Members: SLAIHEE **AGM** (in room 7LA), followed by Lunch (AGM = Annual General Meeting: Only for SLAIHEE 2024 members)
13:30 – 16:00	:	Joint ALTEF & SLAIHEE workshop on '*How can we get HE students to understand well what we teach* (& the role of student voice)'
16:00 – 16:10	:	**Feedback Form Completion, online**
16:15		**Afternoon tea *with* Conference and Workshop Closure**

Paper Presentations

at Conference on Friday, 26 July 2024

	Session 1	**Session 2**
Venue:	**Room 7L A**, Floor 7, Spencer Building	**Room 7L B**, Floor 7, Spencer Building
Session Chair:	**Dr Ruwani Mayakaduwa**	**Ms Sapna Atapattu**
Time	**Paper Title,** author(s), page numbers	**Paper Title,** author(s), page numbers
11.15 – 11.30am	Paper # 1.1 Incorporating student voices and group-work in lectures to transform passive students to active readers and self-learners - Janani Harischandra (pp 1 - 5)	Paper # 2.1 Effect of dialogue-based learning for improving undergraduates' academic achievement in Ayurveda Rasa Sasthra (Ancient Alchemy) - U.R.S.R.K.Senarathne (pp 22 - 27)
11.30– 11.45am	Paper # 1.2 Use of enhanced voicing opportunities to maximize student engagement and learning in group-based tutorials - Alqa Husni (pp 6 - 10)	Paper # 2.2 Utilizing student voices generated through the SQ4R reading of recommended textbooks to foster independent learning - Dileeka Alwis (pp 28 - 32)
11.45 – 12.00	Paper # 1.3 Enhancing student voices in learning: the impact of collaborative group-based discussion activities on student engagement in tutorials - Aniqah Zeezan (pp 11 - 16)	Paper # 2.3 Use of student voice-generating activities in lectures to improve student attention, engagement, and subject learning. - Chathura Wickramasinghe (pp 33 - 37)
12.00 – 12.15pm	Paper # 1.4 Using student voices in assessment to redesign the student learning journey in Foundation Courses - Sudharshan Welihinda & Tharushi Amarasinghe (pp 17 - 21)	Paper # 2.4 Generating enactive, iconic and symbolic student voice representations in university classrooms to improve learning and engagement - Kavindya de Silva (pp 38 - 44)

Reviewers of papers;

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The paper submission and peer-review process: papers that appear in this Book of Proceedings are in the form of `Full Papers', made up of sections comprised of Background / Purpose (i.e., Introduction), Methodology, Results, Discussion and Conclusions, References. Each paper has been accepted and e-printed after a thorough and rigorous double-blind peer-review process. In this process, an Abstract had first been submitted together with a Self-assessment Scoring Sheet. These abstracts were reviewed by the "Papers Committee", and relevant authors were invited to submit Full Papers. Each `Full Paper' then underwent a double-refereeing process by two independent reviewers who provided referee reports and supportive feedback to be sent to authors justifying acceptance, improvement or non-acceptability of each submission. A third referee was used whenever the first two referees were in disagreement. The reports of both referees were discussed, collated and this feedback was sent to authors to accept, reject or to do modifications, if any, to the Full Papers as recommended by both referees to meet the 'quality standards'. Authors had the option of not making the changes if they were able to justify why the referee-recommended modifications were not acceptable. Abstracts that were rejected, or not received by the deadline with the recommended modifications, were not 'accepted' and so, do not appear in this Book of Papers.

Abstracts / papers plagiarised from others' work, when not acknowledged in the submitted material or have a substantial component of plagiarised material, are in general rejected and followed-up by formally writing to the authors, through their institution heads, as practices that are unacceptable and looked down by the entire academic community worldwide.

All referees and presenters have, in this way, collaboratively contributed to enhancing the quality of Higher Education in our motherland. Even where papers were not accepted, we hope the detailed feedback given would have helped authors to improve their subsequent writing and submissions.

Students' perceptions on incorporating student voices and group-work in lectures to transform passive students to active readers and self-learners

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Abstract

I observed that my first-year BSc Artificial Intelligence and Data Science (n=85) students following the Web Technology module were not motivated to self-learn and explore beyond what was taught in lectures. As they were also less interested in self-reading the recommended textbooks or supplementary reading, I deployed a questionnaire that showed the majority as interested in self-learning (90%) but only 56% being slightly enthusiastic about reading. As reading is integral for self-learning, this research discusses transforming these students into active self-learners through introducing a stepwise reading procedure with group work opportunities to voice their thoughts, learning and findings. Lecture times were used to give students (formed into small groups of eight) a concept to learn using the SQ4R reading procedure. At the end of each group session of fifteen minutes, each group was given the opportunity to present their work to the class. To give 'deliberate practice' of this procedure to the students, this learning activity was repeated four times as classroom tasks based on readings from recommended textbooks. Think-Pair-Share intervals were introduced between practice tasks to clarify doubts with the lecturer's input. The student perceptions of the implemented activities were evaluated through an online questionnaire that had a 68% response rate. Results showed that 62% of students did not refer to the textbooks before the activity while 90% of students stated the activity encouraged them to refer recommended textbooks. Of the students, 91% mentioned that the activity helped them to explore supplementary materials and they were willing to engage in similar activities in future. Encouragement, interaction, inspiration, and motivation were major keywords identified through thematic analysis of general comments received. It is evident that learning in groups with peer voice input in reading activities has a positive influence on Artificial Intelligence and Data Science students in the classroom.

Background

The concept of being "student-centered" in teaching is conducive to stimulating the innovative spirit of students and cultivating their core qualities and key abilities (Yikai, 2020). Bell (2010) mentioned that student-centered learning is nourished by higher comprehension of subject matter and self-learning. However, nowadays many university students show less interest in reading activities on recommended textbooks or other supplemental reading materials. Hence, they expect the lecturer to deliver the entire module content, then take notes and only follow the lecturers' instructions. This kind of student behavior is explained as passive learners (McWhorter's, 1995). Bonwell and Eison (1991) stated that exclusive use of the lecture can constrain the learning in students. I observed that the first-year students in

BSc (Hons) Artificial Intelligence and Data Science course undertaking the Web Technology module were not motivated to self-learn and explore beyond what is taught during the two-hour lecture time. Therefore, I conducted a questionnaire to identify to what extent they were involved in reading and self-learning activities. The results indicated that only 56% were slightly enthusiastic about reading while the majority (90%) were interested in self-learning activities. There have been several scholarly inquiries about transforming passive learning to active learning. For instance, Faust and Paulson (1998) suggested that active learning strategies can be implemented in various settings in the classroom such as small group work or discussions, self-reading and learning activities of subject matters.

Doyle (2008) further highlighted that students are required to move beyond taking notes and passing tests to embrace new learning roles. Millis (2012) stated when students read, write and discuss they tend to learn more. Ryandani (2017) indicated SQ4R helps with text comprehension and study as students can comprehend and study the text systematically. As a solution to the problem identified above, I designed a SQ4R activity in small groups during the classroom to get students involved in relevant learning activities. Bonwell and Eison (1991) depicted that small group work, and discussions can be introduced to encourage students to engage in independent learning. Cook-Sather (2014) mentioned that incorporating student voice in learning activities helps students to share their opinions, experiences, and knowledge of subject matter. Also, it helps teachers, researchers, and policy makers gain a better insight of how students make sense of learning and develop capacities to influence improvement. Therefore, lesson breaks as Think-Pair-Share sessions (Biggs & Tang, 2011) were also used to ensure that students share their opinions with peers and the lecturer. The aim of this study was to incorporate student voices and group-work in lectures effectively to transform passive students to active readers and self-learners.

Methodology

The implementation of the methodology was a SQ4R activity promoting self-learning habit of the selected student group as illustrated in Figure 1. This study was conducted with 85 first year students following the Web Technology module in BSc (Hons) Artificial Intelligence and Data Science course. Initially the students were informed about the learning activity via announcements in their learning management system (LMS) and through a motivational script delivered by the lecturer which explained to the students the importance of engaging in self-learning activities via reading, benefits of peer engagement and team working skills, highlighting how these skills will be used in the IT (Information Technology) industry. The instructions to carry out the activity were published in the LMS. Using a randomized grouping strategy, the students in the class were categorized into groups of eight members. The students in each group were given a concept related to that week of the lecture, Cascading Style Sheet (CSS) with questions, which they had to implement in four tasks. Each group was instructed to research and study about the given topic by referring to online resources and two recommended textbooks available in the LMS. Each group was asked to work together with their peers to find, record answers to given questions and style the given web page using concepts learnt within a duration of 15 minutes given for each task. To promote the 'deliberate practice' (Jones et al, 2015) of this procedure in students, this learning activity was repeated four times as classroom tasks based on readings from recommended textbooks. The students had to work independently and share their knowledge with each other where they

were required to present the work carried out at the end of each fifteen-minute break. In between each task, the students were given Think-Pair-Share session as a lesson break activity to answer questions raised by the lecturer and clarify any subject matters. The students were advised to upload their work to a padlet where they can view their peers' work as well. At the end of the activity, the effectiveness of the learning activity was determined using a student feedback form.

Figure 1. The SQ4R Methodology (Churat et al, 2022)

Results

Of the students, 96% of respondents mentioned that they have found the learning activity interesting. It was found that 86% of the students were able to complete the given tasks on time whereas a small group of students felt the time provided could have been slightly extended. 82% of students claimed that the peer input helped them to produce quality work at the end of the learning activity. One of the main goals of the activity was to encourage students to refer to and read recommended textbooks. According to the feedback received from students, approximately 80% of the students had been encouraged to do so. Furthermore, it was found that most students (62%) had not referred the textbooks prescribed previously. The analysis of the results showed that 91% of the students positively mentioned that the activity helped them to explore supplementary materials and they wished to engage in similar activities in the future**.** Out of the students, 88% mentioned that they found Think-Pair-Share sessions useful as it helped them to share and voice their thoughts and bring ideas into peer discussion along with increased interaction between students and lecturer in clarifying doubtful subject matters. Figure 2 illustrates the student perceptions on overall experience and student engagement of the implemented learning activity. Majority of the students have responded positively mentioning that they believed the activity has increased the peer interaction, inspired them to engage in independent and peer learning, and enhanced their knowledge through reading and referring on online resources.

Figure 3 depicts some of the general comments that were received from the students after attending the learning activity. There were many positive comments stating that they were able to learn a concept on their own with improved peer interaction than the traditional lecture time. Thematic analysis was applied to the general comments. Encouragement,

interaction, inspiration, and motivation were major keywords that were identified

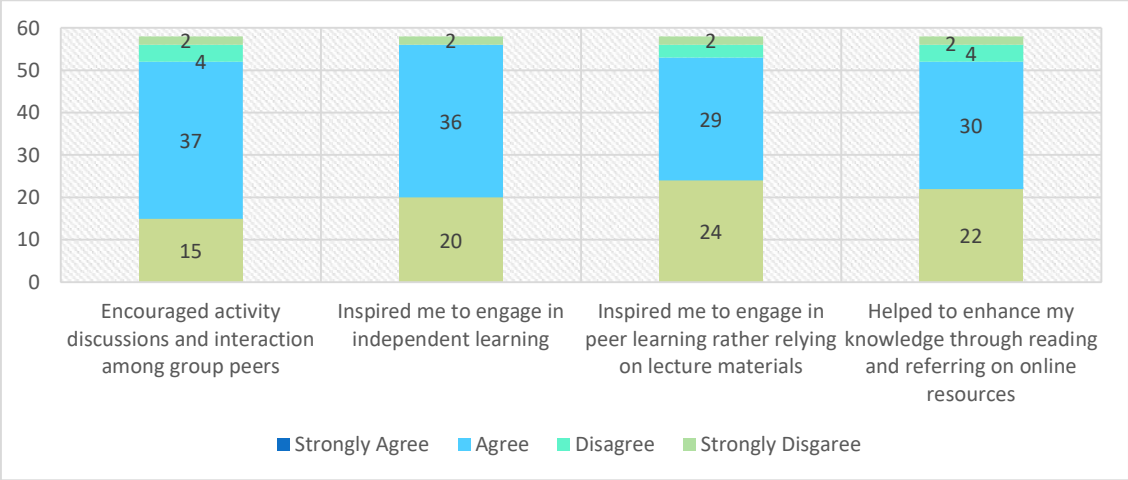

Figure 2. Student perceptions on overall experience

It was more engaging than listening to a lecture.
It was a change in learning from the usual lectures which helped motivate to study more.
The group activity is very organized. The workshop helps me a lot to improve my knowledge in html.
Was able to gain more knowledge through peer interaction than in a normal lecture
we learned alot and this session was very interactive. Looking forward to improve our skills through a learning process like this
Encouraged me to go through the reading materials and discuss doubts among my peers
Encouraged self learning.
In my opinion I totally like this change and hope that these will be activated in the future as well.
It was a pleasant experience working and interacting with peers

Figure 3. Post activity student feedback

Discussion and Conclusion

The findings of the study revealed that students were inspired to engage in reading activities for learning with peer input rather than relying heavily on provided lecture materials. This is further proved by the positive student feedback received on the overall student learning experience after the learning activity. However, implementing student centered reading activities has always been a challenging task in the classroom owing to factors such as time constraints and individual differences. Moon and Kwan (2022) in their research study on improving students' intensive reading ability by using SQ4R method claimed that only 58.4% of students were active which was less than the targeted value of 75%. The results of the study claimed that students liked the opportunity to have peer inputs (82%) and the Think-Pair-Share sessions (88%) during the activity, which helped them to produce quality work while strengthening the student-teacher relationship as well. This was also observed by Mitra (2003), who found that increasing student voice through the sharing of teacher roles benefited learning and improved the teacher's ability to meet student needs. The motivational script that I used encouraged the students to work in groups and carry out the task enthusiastically. While the students engaged in group work, I observed that their group dynamics such as shared responsibility and positive interdependence, communication, and decision making came into play. Furthermore, it can be said that the SQ4R method was also beneficial for examining the student work produced in improving reading comprehension

which adds evidence to similar research by Moon and Kwan (2022). In future attempts at this activity, the student count in each group can be reduced and several module team members could be incorporated during the session to extend further support to students. Peer feedback from the module team could be taken into consideration. This study confirms that learning in groups incorporating peer voice input with reading activities has a positive influence on transforming passive students to active readers and self-learners.

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Use of enhanced voicing opportunities to maximize student engagement and learning in group-based tutorials

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Abstract

In the conduct of tutorials, the biggest challenge was that only very few students attempted the questions prior to attending the tutorial class conducted after their lectures in a second-year Business Analytics module (n= 101, with three tutorial groups of approximately 33). The majority relied on the tutor for answers using the traditional method of taking down answers. To examine if discussion opportunities given to voice their thoughts and opinions could address this challenge and promote active learning, I used group work in this study. Three tutorial groups were divided randomly into subgroups of 4-5 students. Students were asked to work on tutorial questions with group peers prior to the tutorial class. In class, each question was assigned to a group systematically, with groups instructed to discuss and collaboratively present their solutions to the class. Here, diverse approaches were accepted, and peer learning was encouraged. The study was implemented in the 3rd week of the semester and a longitudinal analysis was conducted until the end of the semester. The outcomes of the changes were analysed using self-observations and peer feedback. The google feedback form, with an 80.2% response, showed that 71.6% found it useful to work on the tutorial with their learning groups compared to working alone. 95.1% of the students mentioned that the tutor gave them the opportunity to voice their opinions when presenting as a group. My observations showed that, with group work, the percentage of students attempting tutorial questions increased from 19.0% to 83.3%. Peer learning groups helped students to achieve the learning outcome of answering all tutorial questions by the end of the sessions and encouraged them to attend the tutorial sessions as well. By continuing this practice, students can develop a habit of completing all tutorial questions and achieving the learning outcomes without entirely depending on the tutor.

Background

Nationally and internationally, many higher education institutions follow the practice of conducting traditional lectures followed by tutorial sessions in order to facilitate better comprehension of subject content. Tutorial sessions generally involve setting tasks which the students are expected to complete prior to attending the session. Over the past few semesters, I have had a major concern of the diminishing number of students attempting the tasks provided before attending the class. The aim of this study was to increase the student engagement in Business Analytics tutorial classes and ensuring that the students were well prepared to attend the session. The objective was to ensure that a larger proportion of the students have attempted the tasks and were aware of the learning outcomes of the task. Every year, approximately 120 students enrol in the module, Business Analytics. The student cohort consists of Generation Z who are known to prefer non-traditional teaching methods. Further, Generation Z students are said to prefer engaging and passionate instructors as, they view instructors as facilitators of learning and do not like the lecture as a method of teaching

(Hampton & Keys, 2017). They seek instructional models with in-person engagement requiring guidance at every step. Before implementation, I observed that only very few students made an effort to skim through the tutorial and attempt the optimal number of questions assigned. Peer learning would change the nature of learning to be pleasant, beneficial, and meaningful, as learners become more positive and deeply involved (Mustafa, 2017). Peer learning refers to the process through which learners acquire knowledge and skills through active helping and supporting among status equals or matched companions (Mustafa, 2017). It has shown that students engage more when they are given an opportunity to voice their opinions. Student-centered learning also has a positive impact on attendance (Rissanen, 2018).

Considering the above, I researched different strategies that I could implement to address the challenge faced. To achieve my objective, I decided to incorporate group learning and prioritize active learning.

Methodology

To progress with the implementation, I planned to use action research to address the problem stated above. The implementation was done for the 2nd year students following the BSc. Business Data Analytics and BSc. Business Information systems degree programme who opted for the module, Business Analytics. The enrolled number of students for January 2024 was 101. As the problem was faced during the tutorial classes, I planned to implement the strategy only for tutorial sessions. On the first day of the lecture, I obtained the student list that comprised of the student names, email addresses and student IDs from the registry. I circulated this list around the class as well as via the Blackboard announcements to ensure all students have been included in the list. The students excluded were added after being informed by the respective student. There were three tutorial groups consisting of approximately 35 numbers in each. Each tutorial group was broken down into subgroups of 4-5 using systematic sampling. Once the groups were created, the detailed list with subgroup information was posted as an announcement on the Blackboard. At the beginning of the first lecture, clear instructions of the expectations, outcomes and the purpose of the implementation were provided. The implementation was carried out from the 2nd week of the semester. The lecture and tutorial materials were made available on the previous Friday to give students time to skim through the content. During the lecture, students were given the freedom to sit at any preferred place. For the tutorials, it was made compulsory for the students to sit with their assigned group members. Students were expected to work on the tutorial tasks with their group members prior to the session and be prepared with a documented report of answers for the tasks provided. Students were expected to work on the entire tutorial. They were first given a motivation to encourage them to work collaboratively. During the tutorial session, the questions in the tutorial worksheet were randomly assigned to each group. The group members were expected to present their solutions to the rest of the class. The entire group was asked to present their solutions with their views/observations to the rest of the class. Here, an adequate opportunity was given to the students to express their view. The tutor was a part of the audience and gave opportunity to the other group members to voice out their opinions. After each group completed the respective presentation, the complete solution was explained to the rest of the class by the

tutor. At the end of the session, all the students in the tutorial class had completed the entire tutorial. The process was repeated for the next six weeks of the semester. Having accustomed to the procedure, the students continued the same on a weekly basis without the tutor having to remind them. It was observed that students with their group members and had completed the tasks prior to the session. The success of this intervention was measured with a feedback form with open-ended and close ended questions. On the first day, a Padlet link was also circulated to provide anonymous feedback.

Results

The feedback showed that 71.6% of the students claimed that learning in groups was useful to work on the tutorial compared to attempting it alone. Of the students 74.1% of the students mentioned that working in groups made them express their opinions more freely than in the normal classroom session. 79% of students felt inclusive in their group. Further, 81.5% of the students stated that they were able to achieve all learning outcomes of the tutorial by the end of the class.

As mentioned earlier, the main objective of the tutorial was to increase the student engagement and give them the opportunity to express their ideas rather than to note down what the tutor presents. 82.7% of the students asserted that working with peers exposed them to diverse approaches of answering the questions and solving the problems. The increase in student engagement was an added highlight of the implementation

Figure 1 shows the feedback of students on different aspects of the implemented strategy.

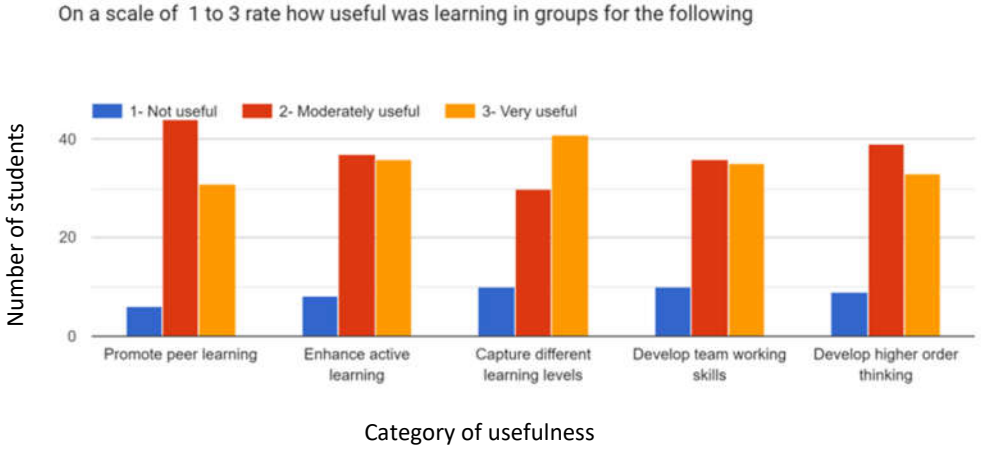

Figure 1. Usefulness of group work, as feedback by participating students (n=81)

Of the students, 82.7% of students mentioned that group work and presentation also improved their communication skills. Further, 81.5% of students claimed that they were able to think differently when working with peers compared to attempting the tutorial tasks by themselves. Furthermore, 72.8% of students felt motivated to attend the tutorial sessions. It was also observed that the attendance was higher once the change was implemented for tutorials this semester compared to last semester where the tutorials were conducted traditionally.

Figure 2 shows the comparison of attendance before and after the intervention.

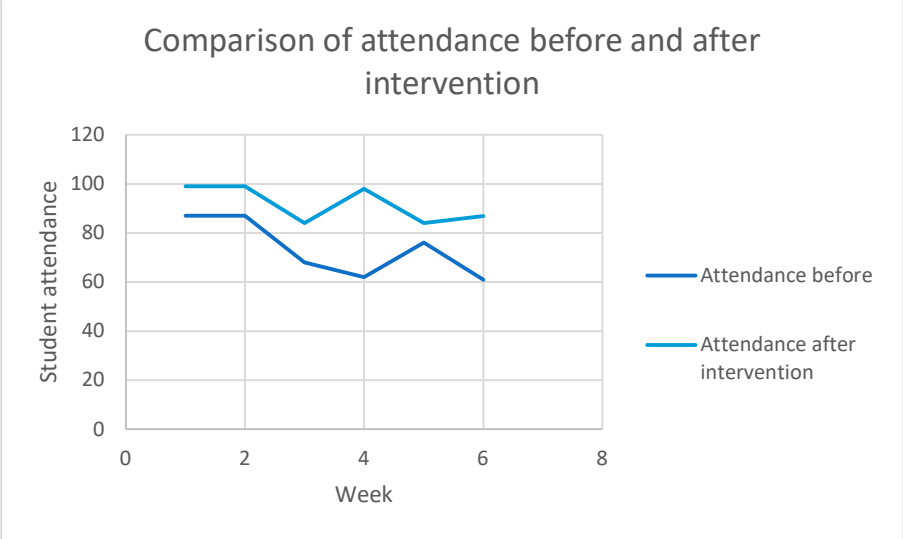

Figure 2. Number of attendees before and after the intervention

As evident from Figure 2, the student attendance had increased notably. The irregular variation is due to coursework submission dates for other modules when student attendance is generally lower.

One of the students reported that "It *was much better than the normal way since we are able to learn other techniques used by others rather than sticking to one method. Overall, the session was interactive and engaging*". Another mentioned "*We were able to complete the tutorial within the given time and this method seems quite effective as we all learnt from each other in the discussion as well as in the classroom."*

Discussion and Conclusion

While the above success is noted, several challenges came up, as described below.

Getting the students accustomed to the procedure initially was a challenge. Although students were seated with their assigned group members without the tutor's supervision, towards the latter stage of the semester, groups only partially completed the tasks. The main concern raised was that there was insufficient time between the lecture and the tutorial for them to work collaboratively. For one of the groups, the lecture and the tutorial was on the same day limiting the time to work with their group members.

Another concern raised was the presence of free riders. Most students in the group were present in class. However, there were a few who were reluctant to present the solutions to the rest of the class. A few also had not contributed to the report. The keen students were the most engaged during the session.

As the same procedure was continued for six consecutive weeks, as the weeks progressed, it

was noticed that the intervention was becoming more challenging particularly due to the increase in complexity of the tutorial tasks. The tutorial was also becoming lengthier over time. Students requested more time to complete the task.

By reflecting on the implementation, results, and feedback, it was identified that a few amendments would be needed in the future implementation of the same. Students preferred to choose the groups on their own as there were instances where some members never contributed to the activity. However, this may result in a biased group where the groups consist of students of similar capabilities. To solve this issue, it is planned to allow the students to choose three members and the tutor could assign one or two members to the group.

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Enhancing student voices in learning: the impact of collaborative group-based discussion activities on student engagement in tutorials

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Abstract

I aimed to enhance student engagement and participation in tutorials by implementing a student-centered learning approach featuring collaborative group-based discussion activities. Tutorials are often deemed less important than lectures by students, resulting in poor attendance and lack of engagement, as I found to be the case in my tutorials also. To address this, I divided 85 students enrolled in the "Requirements Modelling" module into two tutorial groups. Within each group, students were randomly assigned to small groups of 4-5 members to discuss tutorial activities and formulate answers collaboratively. Following the group discussions, students individually answered the tutorial questions. I provided feedback by visiting each group instead of discussing answers with the entire class. The study evaluated the quality of students' answers and gathered feedback on the teaching and learning method. Results showed a 90% improvement in attendance, with students actively contributing to the formulation of answers. The quality of students' answers, in terms of accuracy and completeness, increased by 70%, possibly through their group discussions. Additionally, 78.8% of students reported high engagement and 81.2% students reported high participation levels with this approach. The collaborative group activities promoted accountability, peer learning, and personalized guidance from me as the tutor. The study confirmed that incorporating student voices through collaborative group-based activities, positively impacted student engagement and participation in my tutorials.

Background

I conducted this research to explore strategies to enhance student engagement and participation in tutorials, as these sessions are often perceived as less important than lectures by students. Poor attendance and lack of engagement during tutorials have been persistent challenges in higher education (Lukkarinen et al., 2016), as was found to be the case in my tutorials also. The study aimed to address this issue by implementing a student-centered learning approach involving collaborative group-based discussion activities.

I recognised that student-centered learning has been widely recognized as an effective pedagogical approach that promotes active learning, critical thinking, and increased motivation (Bates et al., 2019). By shifting the focus from instructor-led lectures to student-driven activities, this approach encourages students to take ownership of their learning process and develop essential skills such as problem-solving, teamwork, and communication (Havers, 2010).

Collaborative learning fosters a supportive learning environment where students can learn from their peers and develop a deeper knowledge of the subject matter (Laal & Ghodsi, 2012). Group discussions facilitate the exchange of ideas, promote critical thinking, and allow students to learn from diverse perspectives (Hassanien, 2007). Previous studies have highlighted the positive impact of collaborative group activities on student engagement and academic performance (Wang, 2020; Zhu et al., 2022). From this literature, I was able to identify some possible methods to explore to improve student engagement and participation in tutorials.

Methodology

To address the issue of poor student engagement and participation in my tutorials, I chose to implement a student-centered learning approach involving collaborative group-based discussion activities in the "Requirements Modelling" (RM) module. The study involved 85 students, divided into two tutorial groups (Group A: 45 students and Group B: 40 students). Within each tutorial group, I randomly assigned students to small coursework (CW) groups of 4-5 members (Tutorial Group A: 9 CW groups and Tutorial Group B: 8 CW groups). These coursework groups remained consistent throughout the tutorials to promote team dynamics and a supportive learning environment.

During the first two weeks of the tutorial, I had students sit with their assigned coursework group members, but I conducted the tutorial in the traditional method I had used earlier. In this traditional method, students answered the activities on their own, and I discussed the answers with the entire class towards the end of the session. This methodology was changed from week-3 onwards where, during each tutorial session, I instructed students to discuss the tutorial activities and formulate answers collaboratively within their coursework groups. This collaborative phase was followed by an individual phase where each student answered the tutorial questions independently. I facilitated the learning process by visiting each coursework group individually and providing feedback on their work. This approach, that allows for more personalized guidance and clarification of doubts, differed from traditional tutorials where the tutor discusses answers with the entire class. To evaluate the effectiveness of this approach, I assessed the quality of students' answers using a rubric (Table 1) developed specifically for this study.

Table 1. Rubric that was used to evaluate the quality of students' answers in tutorials

Criterion	**Excellent (4)**	**Good (3)**	**Fair (2)**	**Poor (1)**
Accuracy	Thorough knowledge, no errors	Mostly accurate, minor errors	Several errors, gaps in knowledge	Largely inaccurate, lack of knowledge
Completeness	Comprehensive, all aspects addressed	Mostly complete, minor details missing	Partially complete, important details missing	Incomplete, significant aspects missing

The rubric assessed two key criteria: accuracy and completeness of tutorial answers, with each criterion scored on a 4-point scale (Excellent, Good, Fair, Poor). The total score, ranging from 2 to 8, provided an overall measure of answer quality.

I consistently used this rubric in all tutorial sessions to assess the quality of students' answers. After completing all 10 weeks of learning, I shared a survey to get the students' feedback on this teaching and learning approach applied in tutorials.

Results

The implementation of collaborative group-based discussion activities in tutorials yielded several positive outcomes:

1. Student Attendance

As shown in Figure 1, I observed an improvement in student attendance when collaborative activities were employed in this RM Module (RM) when I compared with other Modules that I taught using the traditional tutorial methods (named as Modules 2 and 3).

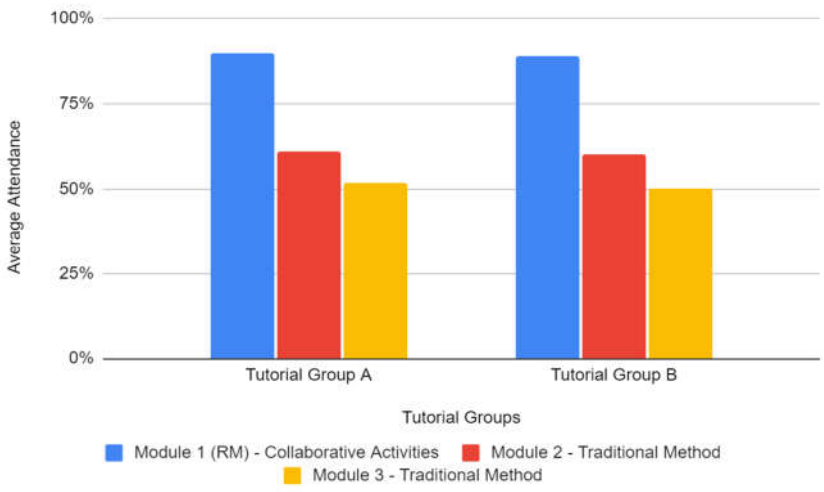

Figure 1. Student Attendance in Tutorials

For Tutorial Group A, attendance reached 90% in Module 1 with the collaborative activities, markedly higher than the 61% attendance in Module 2 and 52% in Module 3 when traditional methods were used. Similarly for Tutorial Group B, I recorded 89% attendance during the collaborative Module 1 activities, contrasted with only 60% attendance in Module 2 and 50% in Module 3 with the traditional tutorial approaches. This difference in attendance levels suggests the collaborative learning environment in Module 1 may have been more engaging and motivating for students across both tutorial groups.

2. Answer Quality

To present the quantitative data demonstrating the increase in answer quality in terms of accuracy and completeness, I compared the scores from the rubric before and after the introduction of the collaborative group-based activities. For Tutorial Group A, the average rubric score increased from 3.8 (out of 8) before the intervention to 6.4 (out of 8) after the intervention, representing a 71% increase in answer quality. Similarly, for Tutorial Group B,

the average rubric score increased from 3.6 (out of 8) before the intervention to 6.1 (out of 8) after the intervention, representing a 70% increase in answer quality.

Table 2. Tutorial answer quality, as Rubric Score, before and after TLA

Period	Tutorial Group A (score out of 8)	Tutorial Group B (score out of 8)
Before	3.8	3.6
After	6.4	6.1
Percentage increase	71%	70%

3. Student Engagement and Participation

In the feedback question to students "Did you report high levels of engagement and participation with the collaborative group-based discussion activities implemented in the tutorials?", 78.8% of the participants reported high levels of engagement, and 81.2% reported high levels of participation with this TLA involving voicing opportunities with collaborative group activities as shown in figure 2 and 3.

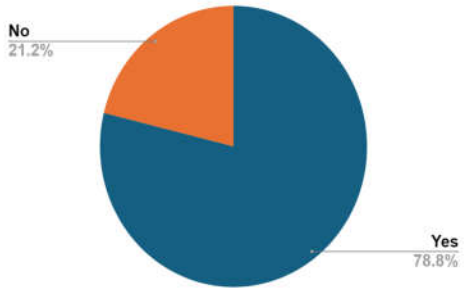

Figure 2. Feedback on engagement

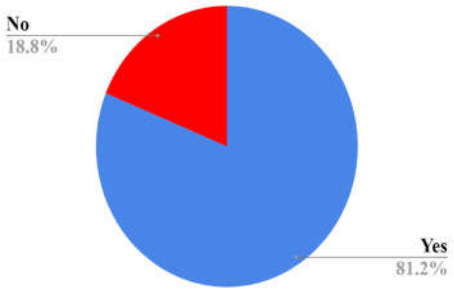

Figure 3. Feedback on participation

4. Personalized Feedback

The post-session feedback I obtained from the students on the method of teaching and learning showed that the students appreciated the personalized feedback and guidance I provided during group visits, and this was evident in the feedback provided by the students as stated in Figure 4.

Having the tutor come around to each group and provide feedback was extremely helpful. The personal guidance really cleared up areas I was struggling with.
I liked how we could ask questions specific to the issues our group was facing and get clarification at the moment. The personalized support was much more useful.
Personalized feedback from the tutor was helpful. It pinpointed exactly where I needed to improve and gave me specific guidance.
The group visits made me feel like the tutor really cared about each student's understanding. The one-on-one time was valuable for getting our questions answered.

Figure 4: Post session feedback

This approach allowed students to clarify doubts and receive targeted assistance from me, which contributed to their overall positive learning experience. The students' feedback indicated that my individual visits to each collaborative group, where I provided focused guidance and clarification, were valued by them. By moving away from the traditional approach of discussing answers with the entire class, I was able to offer more personalized support tailored to the specific needs and doubts of each group. This personalized attention and targeted assistance from me as the tutor seemed to enhance the students' learning experience positively.

Discussion and Conclusion

The findings of this study align with previous research highlighting the benefits of student-centered learning and collaborative group activities in enhancing student engagement and academic performance (Wang, 2020; Zhu et al., 2022). The implementation of collaborative group-based discussion activities in tutorials effectively addressed the issue of poor student attendance and lack of engagement that I aimed to resolve. By fostering a supportive learning environment where students could learn from their peers and diverse perspectives, the group discussions facilitated active participation and accountability (Laal & Ghodsi, 2012). The improved attendance rates and observed active contribution to answer formulation suggest that students benefitted from the collaborative learning experience. The positive student feedback also supports this. Group discussions allowed students to clarify their learning, challenge each other's viewpoints, and collectively arrive at more accurate and comprehensive answers (Hassanien, 2007). While the study findings are promising, I acknowledge that the research was conducted within a specific module and institution. Further research can include use of performance data extending across diverse disciplines and educational settings to test the generalizability of these findings.

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Using student voices in assessment to redesign the student learning journey in Foundation Courses

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Abstract

When students fare badly at examinations specially in the recently proliferated Foundation courses, comments at student-blame abound, such as lack of interest/ability. With students often disinclined to voice learning bottlenecks in class to be helped by teachers, their voices are only 'seen' in written-form at marking their answers or 'heard' at *viva-voce* examinations, showing us 'what' students learnt. Using student 'voices' to map their learning steps can help lecturers to design and plan teaching activities for students to overcome student obstacles/bottlenecks. This paper reports on changing assessment questions to help map such obstacles that 'Programming' module students (n= 448) face, as a needs-analysis step to improve course redesign. Traditional question papers test how successfully students can reach end-products asked in questions. Seeing low performance in these traditional-type questions, the question paper was changed to include a "Gapped Handout" question type. Compared to end-product answers, this tested whether students had learnt subject matter needed to think and plan intermediate stage/s required to reach end-product answer/s: *i.e.,* the 'learning journey process' to reach that end-product. Marks scored from the two question type samples (n= 40) were analysed and evaluated to assist redesign teaching that can improve the 'learning journey process' in students through removing/minimising student obstacle/bottleneck points. Students scored a 41% average mark in answers to traditional-type questions that tested reaching end-products. In contrast, their marks to "Gapped Handout" question type averaged 70%, showing that though Foundation students found it challenging to arrive at a final end-product solution in programming, they easily demonstrated sufficient subject learning to reach intermediate answer steps. It shows "Product *Vs* Process" testing in courses and how courses can be redesigned by better Constructive Alignment to support Foundation-level student needs. Results suggest that for Foundation-level course redesign, student obstacles arising from student background levels need analysis if they are to be offered the needed type of teaching-learning support, based on the Product / Process assessment model.

Background

Students traditionally gain entry to universities after successful completion of an examination. In Sri Lanka, this has been the General Certificate of Education (GCE) Advanced Level (AL) examination. In contrast, the recent introduction of Foundation-level courses has allowed students alternate paths to gain university entry which are: when students have not proceeded beyond passing OL (i.e., prior to sitting the AL), or when students have failed the AL. On these paths, students can follow these Foundation courses offered by many private HEIs, and when successfully completed after approximately 6 months, allow them entry to the relevant degree programme.

Since these Foundation courses are open to a mix of students with GCE OL and AL subject backgrounds, these classes have students from a wide range in age, maturity and skills. When a class is made up of students from such a wide range, this heterogeneous student population makes teaching these classes to be very challenging. When these students gain low marks or fail their summative examinations, the causative factor for the students' incapability to fare well in the assessment is often highlighted as their lack of ability, lack of motivation, lack of interest, etc. This 'deficit model', with regard to students, has been identified as arising from a *blame-the-student stage* in a teacher's developmental path (Biggs and Tang, 2011, p 18).

When student marks from summative assessments do not reach higher levels of performance at the completion of our teaching in these Foundation classes, I have pondered whether it is the teaching methodology that should be redesigned in the Foundation courses rather than ascribe it to a student deficit model of blame-the-student. Redesigned teaching can then incorporate a range of ways that would improve their summative assessment marks by supporting their learning-difficulty steps to make up a more meaningful learning journey for these students. Such a redesign would consider their pre-course knowledge-background levels (at P1) such as in the 3P teaching and learning model (Figure 1).

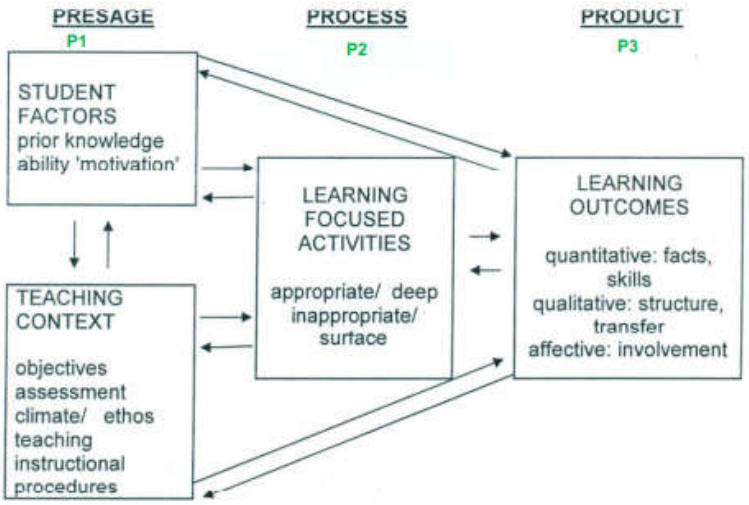

Figure 1. The 3P Model of Teaching and Learning (from: Biggs et al., 2001)

Taking this model into consideration to design teaching can be valuable when a diversity of students are present in a Foundation course, as it takes into consideration their prior knowledge (preparation or backgrounds) as a significant factor that can influence students attaining the Intended Learning Outcomes (ILO's) of the Foundation course. It brings into course re/design the necessity to restructure and redesign the Teaching - Learning Activities (TLA's) as appropriate to students' background knowledge and abilities. It is such an approach that would help most, if not all, students to effectively achieve course ILO's, such as in this Foundation course that I teach. This approach to course redesign would also conform to a Constructive Alignment model of teaching (Biggs, 1996).

To design or redesign a course in this way, requires teachers to know where students' prior knowledge, or lack of it, imposes difficulties or bottlenecks that could prevent students

progressing towards, and achieving, the ILO's of a course. This is the case when students get low marks. Feedback to students to overcome these difficulties is then possible. Even so, students are often not inclined to voice their learning bottlenecks for them to be helped in class due to a complex of factors that includes personal, situational and cultural aspects. Their voices then become only 'seen' in written-form when teachers mark student answers at the end of the course. By this time, however, it is too late to remedy their learning bottlenecks. It follows, therefore, that if mechanisms can be identified and used to generate student 'voices' to bring out these bottleneck points, it can help map their learning stages, associated bottlenecks and then to facilitate their step-wise learning. This form of course redesign, when students are often silent in a heterogeneous class, can be helped by assessment, as shown in this paper.

Assessment can be useful to test different student outcomes. When students use their knowledge and skills to arrive at a final solution / product, it is termed 'Product Assessment'. Progressing to such a 'product' stage is the final outcome and is mediated through facilitating students to progress from "known to unknown" knowledge steps as a procedure. Testing whether students have sufficient knowledge of the steps of a procedure to arrive at that final product, together with the skill to apply these steps, makes up 'Process Assessment' (Brown and Smith, 1997). With these assessment strategies in the background and with students not inclined to voice their learning bottlenecks to classroom questions and inquiries, this paper reports on changing assessment questions as a mechanism to help map obstacles that 'Programming' module students (n= 448) faced, so that this can serve as a needs-analysis step to improve course redesign.

Methodology

Traditional question papers test how successfully students can reach end-products through the questions they are asked, as Product Assessment. After seeing the low performance of students in these traditional-type questions, the question paper was changed to include a "Gapped Handout" question type, with a view to assess how well students were familiar with the steps of the 'Process', and the associated technical terms, in arriving at a product. Compared to end-product answers, this tested whether students had learnt subject matter needed to think and plan intermediate stage/s required to reach end-product answer/s: *i.e.,* the 'learning journey process' to reach that end-product. Marks scored from the two question type samples (n= 40) were analysed and evaluated. A comparison of the marks scored in the Process Assessment and Product Assessment could identify the extent to which students had learnt the process steps and where they experienced learning bottlenecks that prevented them from reaching the product stage. If such bottlenecks could be revealed by such a comparison of marks, it would identify these learning bottlenecks where students needed support. Incorporating such support steps would assist the redesign of course teaching to improve the 'learning journey process' in students. The intention was to help re-design course teaching, aimed at removing /minimising student obstacle/bottleneck points which prevented their learning.

Results and Discussion

On analysis of the assessment results, students scored a 41% average mark in answers to traditional-type questions that tested reaching end-products (in questions of the Product Assessment type). In contrast, marks of the same students in the "Gapped Handout" question type averaged 70%. This showed that though Foundation students found it challenging to arrive at a final end-product solution in programming, they easily demonstrated sufficient learning to reach intermediate answer steps, revealed by Process Assessment.

The Gapped Handout that was used in this study is also referred to as a 'Cloze'. It has been used commonly in language learning where experimental and control group comparisons have shown that the Gapped handout has helped improve language comprehension in students (Nikoopour and Bargnil, 2020). The usefulness of this method has also attracted further study and refinement to develop modified versions that bring about further student improvements (e.g. the "HyTeC-cloze" in Kleijn et al, 2019). This Gapped Handout is similar to the 'Empty Outlines' technique that has been used to evaluate student learning difficulties (Angelo and Cross, 1993, p 138). These methods enable students to 'voice' where they could perform well and where they experienced bottlenecks.

Results of this study helps to show how course steps where students perform poorly can be captured in assessment and used in course redesign. It would lead to better Constructive Alignment of courses so that course teaching would provide improved student support that meet realistic leaning needs of students.

A next step in the case of this Foundation-level course would be to examine if student performance would improve at summative assessments when this course is redesigned by incorporating student voicing opportunities in mid-course itself, such as with use of gapped handouts in classes before summative assessment. Such course analysis and redesign can ensure that the identified student learning difficulties could be remedied before these students face their summative assessments.

Conclusion

Results suggest that for the redesign of Foundation-level courses, student bottleneck points that hinder their learning, such as obstacles arising from student background levels, need to be analysed and addressed. It is in these ways that students from diverse learning backgrounds can be offered the needed type of teaching-learning support as scaffolds that form practical steps in their learning journey.

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Effect of dialogue-based learning for improving undergraduates' academic achievement in Ayurveda Rasa Shastra (Ancient Alchemy)

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Abstract

Rasa Shastra is a subject that converts mineral and toxic materials into non-toxic, absorbable human-friendly medicines. Hence, some special apparatuses and procedures must be followed according to ancient science. The students have shown low marks in the Continuous Assessment (CA) test after 'traditional' teacher-centered teaching for the topic "Yantra" (ancient apparatus), especially in creativity type of high IQ level of questions related to Bloom's revised taxonomy. As a remedial approach to develop these upper Bloom's levels, a half-day workshop giving increased student voicing and interacting opportunities was implemented. Students (n=160) in the second professional batch of their Ayurveda degree program were divided into 06 groups. Each group was asked to select an ancient apparatus and after engaging in peer dialogue, to make a group presentation with the inclusion of a module or structure designed by themselves. Marks were allocated according to the cognitive levels by two lecturers, demonstrators, and one nominated student group. Previous CA marks and marks earned for each group for the group activity were categorized based on remembering, understanding, applicability, analysis and evaluation, and creativity. Results were compared by using a paired t-test. The overall marks scored by the students after the workshop were higher than at the CA. The mean difference between each cognitive level before and after activity exhibited a significant difference ($p < 0.005$). Mark comparisons showed that student-centered, dialogue-supported learning improved student performance compared to teacher-centered methods but cannot be generalized without restructuring teaching to give further student-mediated opportunities to develop their cognitive, affective, and psychomotor domains.

Background

Rasa Shastra is a subject that converts mineral and toxic materials into non-toxic, absorbable human-friendly medicines in Ayurveda.(Savrikar & Ravishankar, 2011). Hence, there is no other way to follow the procedures other than the methods followed by the ancient saints who introduced the subject thousands of years ago. There are also some special apparatus introduced as Yanthra to fulfil these targets (Rajesh et al., 2020). Since there are many previously unfamiliar terms and structures to learn for the students, it is challenging to make effective delivery of the lecture to the students as per textbooks. Thus, teaching has been done by using colourful diagrams and photographs. However, the students have shown lower marks in their Continuous Assessment (CA) test, especially in creativity type of high IQ level questions related to Bloom's revised taxonomy in the given question paper. A dialogue-based student-centered learning activity was implemented as it was necessary to develop application, analysis, and creative thinking patterns in the students to fill the void that may arise in preparing Rasa medicine in Sri Lanka in the future.

Dialogic teaching is a pedagogical approach that exploits the power of talk to further students'

thinking, learning, and problem-solving (Baker, 2022). It can contribute to students' intellectual development and educational attainment when they are guided into increasingly mature ways of thinking by communicating with more capable others and through interactions with their surrounding culture and environment. Also, according to the research, both interaction with adults, and collaboration with peers can afford opportunities for children's learning and cognitive development. As per Vygotsky (1962), children need help from more competent individuals to perform their learning tasks of new things rather than independent learning. According to Barnes (1971), pupils can learn not only by listening passively to the teacher but also by verbalizing, talking, discussing, and arguing.

Methodology

Second-year professional Bachelor of Ayurveda Medicine and Surgery (BAMS) students were selected for this research study. The five questions included in the Continuous Assessment question paper regarding Yantra were made to evaluate the student's skills at levels of remembering, understanding, applying, analysing, evaluating, and creating according to Bloom's hierarchical level or cognitive level. Marks earned by all the students were analysed accordingly.

Then, students (n=160) were divided into 06 groups named A to F. Each group was informed to select any of the ancient apparatus (Yantra) for an exhibition type of presentation as a group activity. Inclusive criteria for the activity, oral presentation, providing the structure or module of the apparatus relevant to their selected topic, equalization to the present types of equipment or process with ancient type, proposing novel ideas as a modification for the future, and active participation and talking of each member of the group were compulsory. Students were given a free environment for their learning activities. Further guidance was given if needed, and they were fully facilitated. The venue was the pharmaceutical laboratory of the Department of Ayurveda Pharmaceutics and Community Medicine. The students were also permitted to use its external garden as per the requirement. Students were given one month for the preparation and four hours for the workshop.

Marking criteria were also prepared to evaluate their achievement according to Bloom's hierarchical levels of learning objectives. Two lecturers and two demonstrators were appointed including myself as the evaluation panel. One student group also was selected for judging another peer group. Written documents having all the guidelines and marking criteria were uploaded to the courses page of the University Learning Management System (LMS).

Results

Students' Cognitive Development was evaluated by analysing the marks they obtained for the Continuous Assessment Test after traditional teaching. As per Table 1, 83.75 % of students achieved the learning outcome of remembering level and more than 63.75% of the students showed the understanding level of the subject content. Nearly half of the batch have shown applicable level knowledge and 32.5% of them have shown good analytical and evaluation levels. When considering their Creativity level, only 24.02 percent of the students had achieved this target.

Table 1. Results of the Continuous Assessment Test

Q	CA Question equivalent to learning outcomes	Number of students who gave the correct answer (n=160)	Students' percentage who gave the correct answer
Q1	Remembering	134	83.75
Q2	Understanding	102	63.75
Q3	Applicability	81	50.62
Q4	Analysis and evaluation	51	32.50
Q5	Creativity	38	24.02

Figure 1 shows the pattern of falling students' marks when the questions are created from lower cognitive levels to upper hierarchical levels.

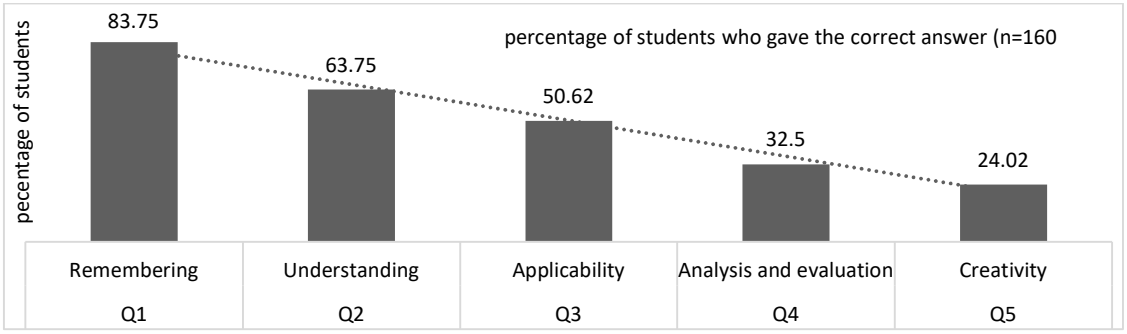

Figure 1. The results of the Continuous Assessment Test

Total marks earned from each group for the dialogue-based learning activity were calculated and evaluated according to Bloom's revised taxonomy (Table 2).

As per Table 2, the remembering and understanding levels of students had developed up to 96.5% and 92.2%. Applicable knowledge of the subject has developed up to 81% of students. Among all students, 76.3% have shown their analytical and evaluation level of learning. The number of students who achieved creative knowledge was 68%.

Figure 2 shows the achievements of students' learning outcomes regarding the subject equivalent to Bloom's reversed taxonomy. Accordingly, students had achieved learning levels regarding Yantra to a satisfactory level.

Table 2. Results - Marks obtained after the new Teaching & Learning activity by each group

Q	Marks equivalent to learning outcomes	Total marks (out of 100) of Groups A to F						Total marks for each cognitive level (out of 600)	Average marks for each cognitive level
		A	B	C	D	E	F		
Q1	Remembering	97	97	95	98	97	95	579	96.5
Q2	Understanding	92	94	92	90	93	92	553	92.16
Q3	Applicability	82	82	85	79	80	83	491	81.83
Q4	Analysis and evaluation	75	75	79	76	75	78	458	76.33
Q5	Creativity	68	69	68	66	70	67	408	68.00
Total marks for each group		414	417	419	409	415	415		
Position of the group		04	02	01	05	03	03		

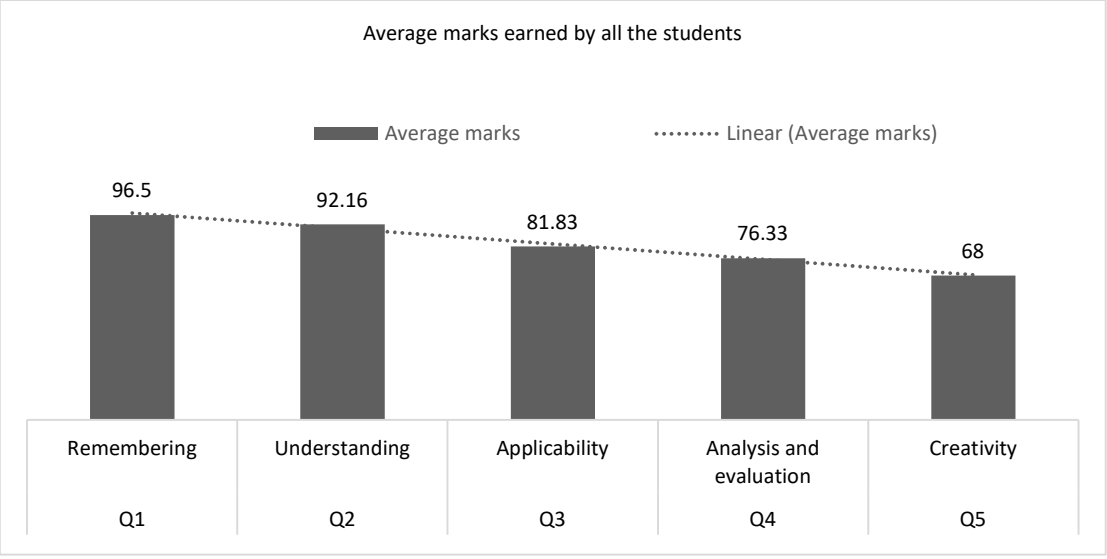

Figure 2. Average marks of all students based on Bloom hierarchical levels

Figure 3 depicts the percentage of the total marks obtained by the whole batch for each type of cognitive level before and after the activity. All levels of knowledge showed improvement

after the dialogic activity and, especially it was more prominent when it comes to upper hierarchical levels like analysis and creativity. As per the paired t-test results, the difference between before-activity marks and after-activity marks showed a significant difference ($p = 0.005$).

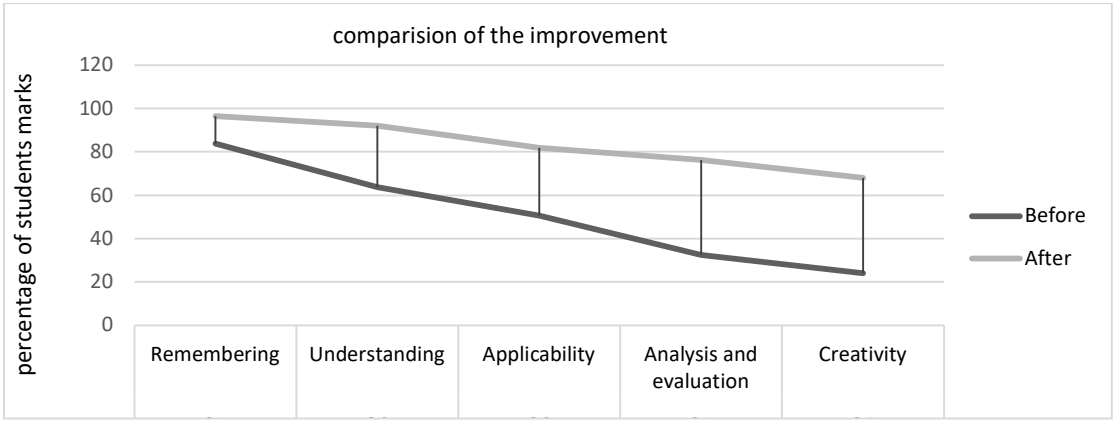

Figure 3. Comparison of the marks before the activity and after the new Teaching & Learning activity

Discussion and Conclusion

Students have shown significant improvement in their knowledge while they are experiencing dialogue-based learning. According to the observations of this research, remembering and understanding parts of the learning have been mostly established through traditional types of teacher-centered learning. However, applicability, analytical, and evaluation types of higher-order thinking skills as well as the creativity of the pupils have shown less promotion. When a teacher facilitates students to engage with peers, they get opportunities for dialogue with different students having different cognitive levels. This knowledge-sharing process allows students to articulate their perceptions, listen to others' views, and empower their reasoning skills. The opportunity for classroom talks encouraged the free conversational rights of the undergraduates. Students had to critically think and search for more details according to the activity guidelines and it also can be considered a type of problem-based learning. Moreover, there was an opportunity to ask questions from others and correct them if there were misunderstandings. As a result of all the efforts, undergraduates have shown significant improvement in their academic achievement while they are experiencing dialogue-based learning.

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Utilizing student voices generated through the SQ4R reading of academic textbooks to foster independent learning

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Abstract

Students who follow the first-year Database Systems module in the School of Computing displayed a reluctance toward independent learning to reference academic textbooks. This resulted in limited comprehension of the concepts and lower performance on theory-based questions. The research, therefore, aimed to foster independent learning skills through recommended textbooks to enhance students' preparation for the theory-based questions. The stepwise SQ4R Reading Strategy was implemented as an in-class intervention, incorporating textbooks. 109 students studying the module were divided into groups of 4 and assigned distinct sub-topics based on module content taught in prior lessons and aligned with two textbooks. Each group was instructed to use SQ4R to conduct a comprehensive review of the assigned sub-topic utilizing both textbooks and formulate examination standard multiple-choice questions. While individual students formulated questions, the group collectively selected, through dialogic discussion, the most suitable question from each member. The finalized questions were submitted to the tutor, and the questions aligned with the examination standards were chosen for an interactive online quiz. The students were divided into teams during a follow-up session to administer the quiz and advised to collaboratively discuss and submit a single response to each question. The effectiveness of the reading activity, student discussions and the interactive quiz were evaluated through tutor and peer observations. 55% of student perceptions indicated that the activity served as an exciting learning experience and strongly inspired them toward independent learning. Active student engagement and constructive group discussions were observed. A novel learning initiative was effectively implemented, utilizing the SQ4R reading strategy to encourage students to consult recommended textbooks through peer discussions, thereby promoting independent learning. To be effective, necessary measures must be taken to mitigate superficial learning among students, prevent diversified submissions and enhance the accuracy and quality of submitted work.

Background

The advent of Industry 4.0 significantly transformed the field of Information Technology (IT), emphasizing the need for IT professionals to possess interpersonal skills like communication, collaboration, critical thinking, and independent learning (Borrageiro & Mennega, 2023). Higher education institutes and their teachers are therefore tasked with fostering independent learning in students by changing teaching methods to equip students for success in this dynamic environment. Independent learning, characterized by students taking ownership of their learning needs and applying strategies to address them, is essential for developing problem-solving skills and adaptability in novel contexts. Implementing innovative strategies like game-based learning and collaborative approaches can foster independent learning, thereby enhancing student engagement, motivation, and comprehension of complex concepts (Bosch et al., 2024).

Academic textbooks are crucial in university education, offering diversified and comprehensive content to support the curriculum. They promote independent learning by providing in-depth knowledge, supplementary materials, and preparation for assessments. However, many students disregard textbook references due to a lack of interest in traditional reading, the simplicity of lecture notes, tedious textbook content, social media distractions, and insufficient motivation from lecturers (Song et al., 2022). To encourage student engagement with academic textbooks, many universities have implemented the SQ4R reading strategy, as illustrated in Figure 1. The strategy aims to improve reading comprehension and retention, while boosting the ability, interest, and participation in reading, ultimately transforming passive learners into active participants (Mahastu et al., 2022).

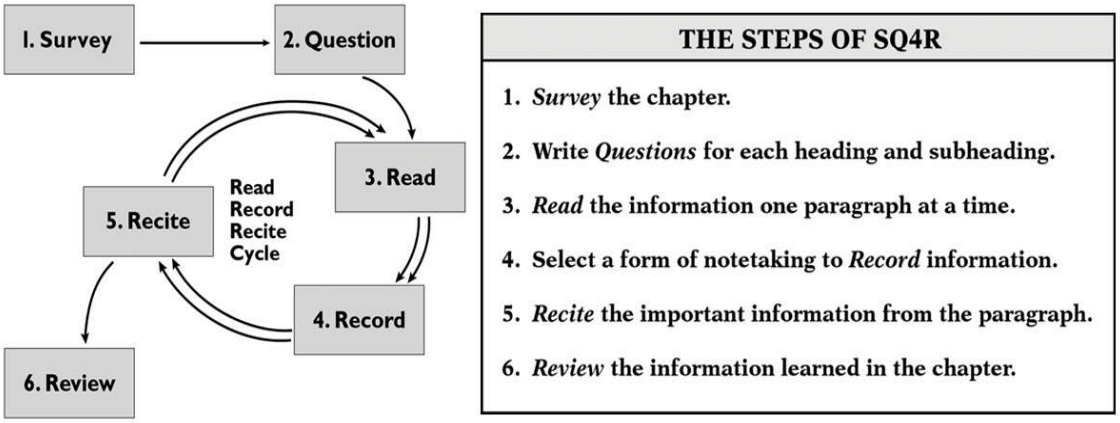

Figure 1. SQ4R Reading Strategy (Bepko Learning Centre, 2006)

An analysis of the mark logs for three consecutive cohorts revealed that 15% of first-year, first-semester students who followed the Database Systems module of the BSc in Artificial Intelligence and Data Science program failed to meet the minimum academic requirements. The final examination results underscored inadequate student performance in theory-based questions, emphasizing the necessity for deeper engagement with the academic textbooks to enhance comprehension of the module content. Subsequently, a survey of newly enrolled students revealed that 65.5% exhibited little to no enthusiasm for reading books. This prompted action research to investigate whether implementing the SQ4R reading strategy could encourage students to refer to textbooks, foster independent learning, and enhance their performance on theory-based questions.

Methodology

I implemented an in-class intervention comprising two phases: the SQ4R reading activity and an interactive quiz game, spanning five weeks of lectures and tutorials. The study encompassed a main lecture group of 109 students and three tutorial groups, each with a maximum of 40 students. During the initial lecture, students were directed to download PDFs of two recommended textbooks for the module. They were encouraged to refer to textbook chapters listed at the conclusion of each lecture at their convenience, aligning these chapters with weekly lesson content.

Following the third lecture, I observed that many students had disregarded this task. Consequently, during the fourth tutorial session, I conducted the first phase of the intervention, the SQ4R reading activity. Students were randomly grouped into teams (of four), with each team assigned a unique sub-topic aligned with module content from previous lectures. I introduced the steps of the SQ4R reading strategy and instructed students to spend one hour (in class) silently reading relevant content from both textbooks pertaining to their assigned sub-topic. While reading the content, each student was tasked with independently formulating several multiple-choice questions (MCQs), avoiding duplication of questions from the textbooks, and using external aids such as internet searches or generative AI tools like ChatGPT. The questions were required to be meaningful, relevant, and aligned with final examination standards. Subsequently, I allocated the following hour of the tutorial session for team members to collaboratively review the MCQs created by each member and collectively select the most appropriate question from each. Finally, the teams emailed me the finalized MCQs and the corresponding answers.

In the second phase of the intervention, I assessed the quality of each group's submission and selected questions that approximated examination standards. Subsequently, I created an online quiz game utilizing Quizizz.com, an interactive learning platform enabling the creation and participation in quizzes and learning games. During the fifth lecture, I randomly divided students into teams (of four) to administer the quiz game. Students were instructed to engage in group discussions and collaboratively submit one response to each question within the allocated time frame without consulting textbooks or any external resources.

The efficacy of the reading activity, quiz game, group discussions, and engagement in independent learning were evaluated using direct observations by 4 academic staff members. Questionnaire forms were used to collect student and peer perceptions. Module grades were compared between this SQ4R batch and three previous non-SQ4R batches.

Results

Among the 109 registered students, 87 participated in the questionnaire. Feedback from students (Figure 2, before the intervention) revealed that 52.9% showed slight enthusiasm for reading, while 12.6% expressed no enthusiasm at all. Additionally, only 69% of students had referred to designated textbook chapters, despite 96.6% having downloaded at least one textbook during the first lecture. The criteria utilized to

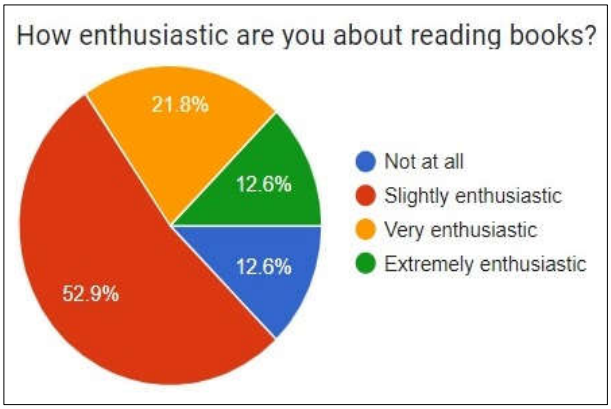

Figure 2. Student enthusiasm towards reading

capture student perceptions are outlined in Table 1. Furthermore, students noted that the intervention was beneficial for gaining comprehensive knowledge and enhancing memorization of relevant lesson parts, thus making learning more interesting. They also reported increased motivation towards independent learning and peer discussions, expressing a desire for more such interventions to further enhance their learning experience.

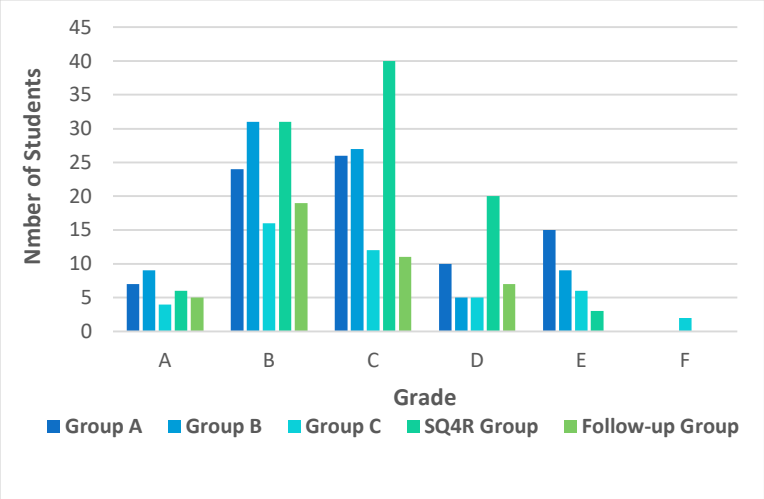

Figure 3. Mark log analysis of pre and post SQ4R batches

Table 1. Student Feedback Summary

Intervention	Criteria	Scale (%)				
		1	2	3	4	5
SQ4R Reading Activity	Encouraged me to refer to the recommended textbook of this module.	2.3	9.2	18.4	26.4	**43.7**
	Improved my knowledge on essential and complex module content.	2.3	4.6	26.4	33.3	33.3
	Inspired me to explore supplementary reading materials beyond the context of this activity.	2.3	12.6	18.4	25.3	**41.4**
Quiz Game	Delivered in-depth summary of essential and complex module content.	2.3	9.2	16.1	41.4	31
	Assisted in gaining insights into diverse exam questions.	3.4	6.9	17.2	35.6	36.8
	Enhanced my knowledge in answering the theory-based exam questions.	1.1	5.7	25.3	36.8	31
The Overall Activity	Assisted in remembering the essential and complex theory-based module content.	2.3	5.7	21.8	35.6	34.5
	Encouraged active discussions and interaction among group peers.	2.3	4.6	16.1	28.7	**48.3**
	Was interesting and a valuable addition to enhance my learning experience.	2.3	4.6	20.7	28.7	**43.7**
	Inspired me to engage in independent learning and peer learning rather than relying heavily on provided lecture material.	1.1	4.6	16.1	23	**55.2**

1 - Strongly disagree and 5 - Strongly agree

The peer perceptions showcased the effectiveness of small group discussions in fostering student engagement and independent learning. Furthermore, the results indicated that the intervention enabled students to gain insights into various examination questions, thereby improving their ability to address theory-based questions. Active student engagement and constructive group discussions were evident. Notably, students who regularly engaged in reading, demonstrated significant enthusiasm for implementing the SQ4R reading strategy. Module grade comparisons of the three non-SQ4R batches (Pre-SQ4R Groups, A-C) with those of the SQ4R batch (Experimental Group) and a follow-up SQ4R batch (Figure 3) showed the SQ4R intervention significantly reduced the number of fail grade students (grades E and F).

Discussion and Conclusion

Despite initial resistance towards reading, students were inspired to explore supplementary reading materials. The findings revealed that the intervention was an exciting learning experience that fostered active group discussions and independent learning. Close monitoring of student behaviour mitigated the use of external aids throughout the intervention. Small group discussions played a crucial role in assisting students with language barriers. Careful planning and clear guidelines were pivotal in addressing potential challenges.

The same intervention was applied to another group of students (Follow-up SQ4R Group) in the subsequent semester, yielding results closely mirrored those of the experimental group. This approach can be generalized by implementing measures to enhance effectiveness, minimize superficial learning, and promote the intended learning outcome (ILO) through improved accuracy and quality of submissions. The intervention evolved into an innovative educational initiative incorporating the SQ4R reading strategy, prompting student engagement with textbooks through peer discussions. This strategic approach played a significant role in nurturing independent learning, thereby substantially enhancing students' academic achievements.

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Use of student voice-generating activities in lectures to improve student attention, engagement, and subject learning

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Abstract

Students (n=150) following the 'Working with Data' Module in the Foundation Course at IIT have shown limited attention spans during lectures. They have also shown that it was difficult for them to retain attention and engagement to correctly learn and apply the subject concepts to design databases during their practical application sessions. This attention discontinuity and reduced learning had demotivated them to think that they were taught at levels too advanced for them. These problems triggered me to seek and implement teaching methods to overcome their attention loss and learning failure. With guidance from a teaching development course, I used lecture breaks for think-pair-share and group-share discussion activities (with 5-8 students per group) along with students filling out gapped handouts and involving in interactive quizzes, followed by having student pairs/groups presenting their agreed answers to the class. Student attention changes were noted with the help from a support lecturer using direct classroom observations. A student feedback questionnaire was used to evaluate the resulting self-directed learning, peer learning and the quiz performance that resulted from giving opportunities for student voice exchanges in this manner. The direct classroom observations by the support lecturer showed that student attention increased by 62% and quiz results showed a 35% improvement in providing correct answers by the students. Student feedback showed that 86.3% of students were interested in the methods and believed they had improved in attention, engagement and subject learning. Classroom activities that offer opportunities for students to dialogue can be effective in addressing conceptual learning difficulties that students face. Having an activity break with self-reflection time and a peer discussion can help students to memorize and keep their focus on the subsequent component of the lecture, making them improve their learning by actively engaging in the lecture. Careful guidance to students on what and how to do these activities will be the key to completing such activities to achieve a successful outcome.

Background

Students following the 'Working with Data' Module in the Foundation Course (n=150) at IIT have shown limited attention spans during lectures. They have also shown that it was difficult for them to retain attention and engagement to effectively learn and apply the subject concepts. Such 'applying' the concepts would result in these students 'effectively learning' to reach the desired 'Course Intended Learning Outcome'(CILO) as the learning 'product' of the course. While there can be different definitions of 'effective learning', in this subject / course that I teach, 'effective learning' could be evaluated by testing whether students can apply the 'facts' and 'concepts' I taught to design databases during their practical application sessions, in the form of 'procedural' knowledge they had developed (see Figure 1: first three consecutive rows in column 1 of Revised or 'new' Bloom's taxonomy). If my students cannot do so, then, I would fail as a teacher as my students have failed in 'effectively learning' the

CILO's that I have been asked, and tasked, to teach.

Knowledge Types	Levels of Learning: Remembering process	Understanding process	Applying process	Analysing process	Evaluating process	Creating process
Factual Knowledge	define, duplicate, list, memorize, recall, repeat, reproduce state	classify, describe, explain, identify, locate, recognize, report, select, translate, paraphrase	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use	appraise, compare, contrast, criticize, differentiate discriminate, distinguish, examine, experiment, question, test	argue, appraise defend, judge, select, support, value, evaluate	assemble, construct, create, design, develop, formulate write
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

Figure 1. Revised Bloom's Taxonomy (From: Anderson & Krathwohl, 2001)

While "there is no such thing as an unmotivated student: all students not in a coma want to do *something*" (Biggs and Tang, 2011, p 34), it is known that learning effectiveness can be influenced by several factors such as reduced motivation, attention, attendance etc. Attention can be monitored visually in class and when attention is discontinuous, to result in reduced learning, it can demotivate students to think that they were taught at levels too advanced for them. These problems triggered me to seek and implement teaching methods to overcome the attention loss and learning failure in my students.

According to Mundelsee and Jurkowski (2021) the 'think-pair-share' method can increase active engagement and student participation in the classroom as it increases the self-confidence in a certain knowledge area of a student. Having think-pair-share can increase active engagement, student preparation for the classes, and outcomes of the assessments (Fitzgerald, 2013). According to Boud et al. (2014) peer learning helps to achieve a different set of outcomes which cannot be easily achieved from other learning methods, such as interpersonal skills, critical reflection and inquiry skills, communication skills, and self and peer assessment skills. According to Wilkinson et al. (2019) using quizzes in a lecture or prior to an assessment can improve the outcome of an assessment.

One of the issues I noticed about my lecture was that students were unable to apply some of the theory concepts and they were not confident of any method to communicate this inability with me. Some of them did not like to communicate directly with me, in my role as the course lecturer.

Methodology

With guidance from a teaching development course, I used lecture breaks for think-pair-share and group-share discussion activities (with 5-8 students per group) along with students filling out Gapped Handouts and doing interactive quizzes. These Teaching and Learning Activities

(TLA's) were followed by having student pairs/groups presenting their agreed answers to the class, such as from the quizzes. For Gapped Handout preparations, at the beginning of the semester, I prepared lecture material and included small gaps in them. I informed students at the start of the semester on the method to be followed during lecture in that semester. I informed students to form their allocated groups. I asked students to complete an activity break with think-pair-share and group discussion. A simple question was given at the end of the lecture to check the students' knowledge-gain on the main concepts discussed. With the help of the support lecturer, student attention changes were monitored using direct classroom observations. A student feedback questionnaire was used to evaluate student opinions and interest in the new methods and their perception of its usefulness to improve their subject learning in lectures.

Results

The results from the direct classroom observations were compared with similar observations from the teaching I had carried out in the previous semester for the same students. Noting that I was the same lecturer who taught last semester also, the comparison showed that at each week of the course delivery that used the new TLA's (Figure 2), student engagement had improved by 62% after the voicing opportunities were provided to them and to sometimes reach a level of nearly 100% engagement. This indicates strongly that the new TLA's that were used, with the voicing opportunities, had made students to become interested in participating and engaging in the classroom activities.

While the direct classroom observations showed that student attention increased by 62%, it is the quiz results that can show whether that increased engagement made them to be 'effectively learning' to achieve marks and reach the CILO's: i.e., to become capable to apply the 'facts' and 'concepts' I taught in lectures using the 'procedure' to correctly design databases in their practical application sessions.

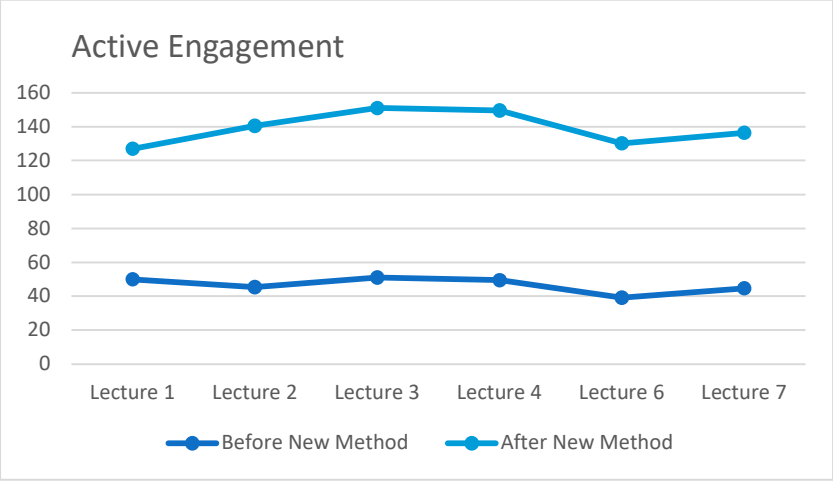

Figure 2. Increase in student engagement after introducing TLA's with student voicing opportunities (student total number= 150)

These quiz results (Figure 3) showed a 35% improvement in students being able to give the correct answers, compared with the previous semester quiz results when quizzes were provided via the Moodle LMS. Thus, the newly introduced TLA's with voicing opportunities had facilitated students to increase their learning effectiveness to progress towards reaching the CILO's.

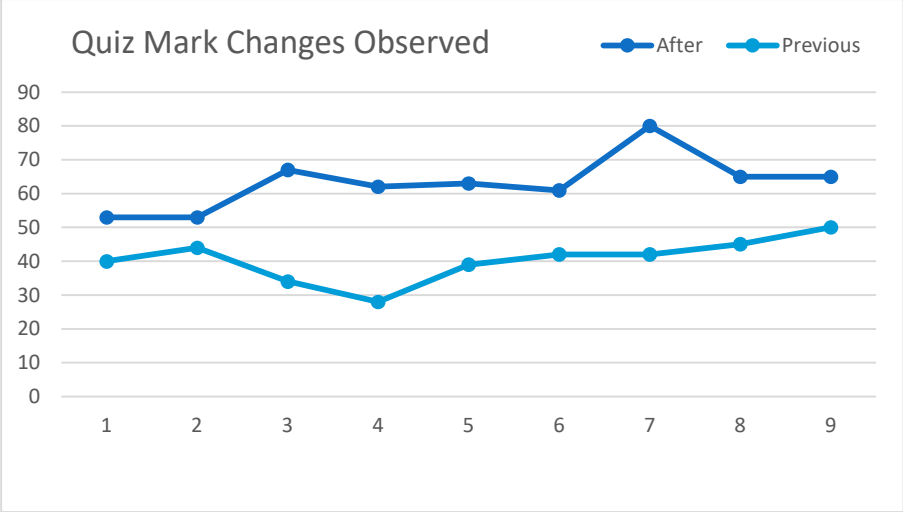

Figure 3. Increase in student quiz marks after introducing TLA's with student voicing opportunities over 9 sessions

The self-perceptions of the students on the usefulness of the new TLA's was captured in the student feedback. Almost all the students who responded (98.4 % in Figure 4) believed that the activity breaks which incorporated voicing opportunities had helped to improve this learning. The student feedback analysis also showed that 86.3% of students were interested in the new TLA methods and believed they had improved.

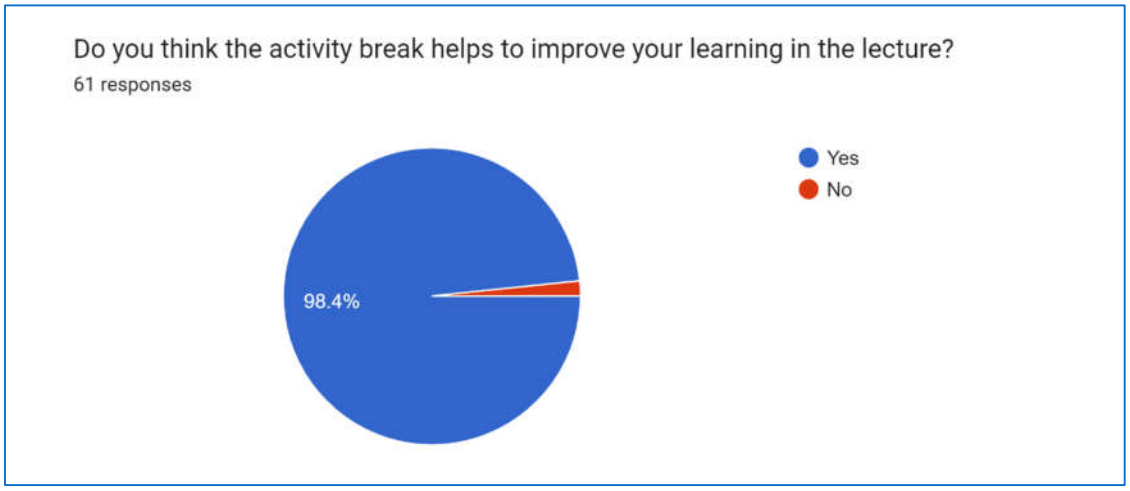

Figure 4. Student feedback responses on whether the new TLA helped their learning to improve

Conclusion

Classroom activities that provide opportunities for students to 'dialogue' can be effective in addressing conceptual and procedural difficulties that students face. Having an activity break with voicing opportunities that provides self-reflection time and a peer discussion can help students to retain important lecture content in short-term memory while keeping their focus in the next part of the lecture. This can make them progressively improve their learning by actively engaging in the lecture. Apart from teachers knowing these methods, careful guidance to students on what and how to do these TLA's will be the key to completing such activities to achieve a successful outcome.

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Generating enactive, iconic and symbolic student voice representations in university classrooms to improve learning and engagement

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Abstract

The traditional sage-on-the-stage teaching model leaves little room for student activity and results in student boredom and disengagement. When my classroom also behaved similarly and disturbed me, I wanted change. Then, concepts discussed in a teaching development course made me modify my teaching to help students following demography courses to learn and voice subject content differently through Bruner's enactive (action-based), iconic (image-based), and symbolic (language-based) ways of learning representations. These teaching changes and student responses are reported here. After explaining how important student engagement was, for learning and performing well, a class of students (n = 29) following 'Demographic Techniques' was guided to do game-based learning that involved them to voice learning through enactive engagements and in doing calculations related to learnt subject matter. Another class following 'Human Resource Development and Labor Market Planning' (n = 42) was guided to do concept maps to help them represent content as iconic representation voices. Both classes were instructed to use group discussions (of 5 to 6 per group) and present learning in symbolic (language-based) representations. Personal observations, student feedback and pre-post-performance changes were used to evaluate teaching and learning method effectiveness. After doing enactive (game-based) learning, average marks increased from 30% to 80%. Speed of doing calculations also increased. The iconic (concept mapping) activity also led to marks reaching 80 to 90%. Students also visualised linkages among items in their subject matter more effectively. The three types of voicing led to increases in student enthusiasm in doing classroom activities with increased interest, engagement, and participation. In the feedback, students stated that their interest and engagement in the subject had increased. Results suggest that student learning performance and engagement increase after giving students the opportunities to practice voicing and representing their learning through enactive, iconic, and symbolic activities.

Background

In general, university lecturers still play sage-on-the-stage lecturing to rooms full of passive and supposedly absorbed students (Weston & Felten, 2023). It leaves little room for student activity and results in student boredom and disengagement. Since I observed a similar situation with my students during lecture hours in the classroom, I wanted a change by implementing 'guide-on-the-side' teaching model. Enactive Teaching in higher education is a narrative exploration of embodied teaching in the university classroom based on the enactive view of cognition (Hocking, 2004). Therefore, this study was conducted to improve student learning and engagement using Bruner's enactive (action-based) as well as iconic (image-based) and symbolic (language-based) ways of learning representations (Bruner, 1966).

Methodology

In the Teaching and Learning Activities (TLA's) involving group work, voicing opportunities of varying durations were provided and encouraged across all student engagement activities and are described below. For enactive engagements, the TLA was conducted for the second-year students who followed 'DMG 2123: Demographic Techniques' (n=29), the group activity involved six groups of five students each (one group had four students). The activity was split into two parts: Part A (10 minutes for drawing mathematical and technical concepts) and Part B (time measured for calculations and interpretation, followed by a 5-minute presentation per group). Marks obtained before and after the group activity and the individual activity were used to evaluate the impact of this intervention. In addition, student feedback, comments and observations were collected. The TLA for iconic representations was to create a concept map. This activity was conducted for the third-year students who followed 'DMG 3245: Human Resource Development and Labor Market Planning' (n=42). Students were grouped into seven groups, with six students per group. The activity included writing concepts/ subtopics (5 minutes), adding details as meaningful questions (10 minutes), providing meaningful examples for the questions (12 minutes), and analyzing links/ connections between concepts and details (3 minutes), with an 8-minute group presentation. Marks obtained, student feedback, comments and observations were used to evaluate the impact of this intervention.

Symbolic (language-based) TLAs involved presenting the students' learning in language-based representations through their group presentations as products resulting from the above TLA's. Their own group discussions, in communicating among individual students, would also have involved symbolic language-based activities, through the voicing opportunities that the students used.

Results

Table 1 summarizes the observations before and during the group activity and during the individual activity. The students were given the same calculation before implementing the math game. Most students were not enthusiastic and their body language, facial expressions reflected that they had negative feelings and discomfort about the calculation. However, during the implementation of math game activity, students became enthusiastic, and they drew the learnt mathematical and technical concepts creatively by using different symbols, colors, words, phrases, pictures and etc. The participation and engagement levels of students were high during the activity, and they asked for help as well. All the groups completed Part A of the activity in under 10 minutes and Part B of the activity in under 20 minutes (average). Furthermore, all the groups obtained the correct answer, and the interpretations were presented accurately with deep knowledge of the learnt concepts. After the group activity, the students were given an individual activity (a similar calculation) and they were able to complete the calculation in under 18 minutes (average).

Figure 1 and Table 2 depict the improved marks that resulted from this TLA. It shows that the average mark of the activity without implementing the game-based learning activity was approximately 30%. It increased to 80% after implementing the game-based TLA. In addition, all groups scored higher marks after implementing the activity. Table 2 depicts that majority

of the students (93%) scored the maximum mark for the individual activity.

Table 1. Summary table of observations on the enactive engagement activity

Observation	Group Activity		Individual Activity
	Before	During	
Enthusiasm	No	Yes	Yes
Visible Satisfaction	No	Yes	Yes
Improvements	Somewhat	Yes	Yes
Participation	Somewhat	Yes	Yes
Engagement level	No	Yes	Yes
Problem-solving skills	Somewhat	Yes	Yes
Confidence	No	Yes	Yes
Use of resources	Yes	Yes	Yes
Persistence	No	Yes	Yes
Creativity	No	Yes	Yes
Critical thinking	No	Yes	Yes
Application of concepts	Somewhat	Yes	Yes
Reflection	No	Yes	Yes
Nonverbal cues	Yes	Somewhat	Somewhat

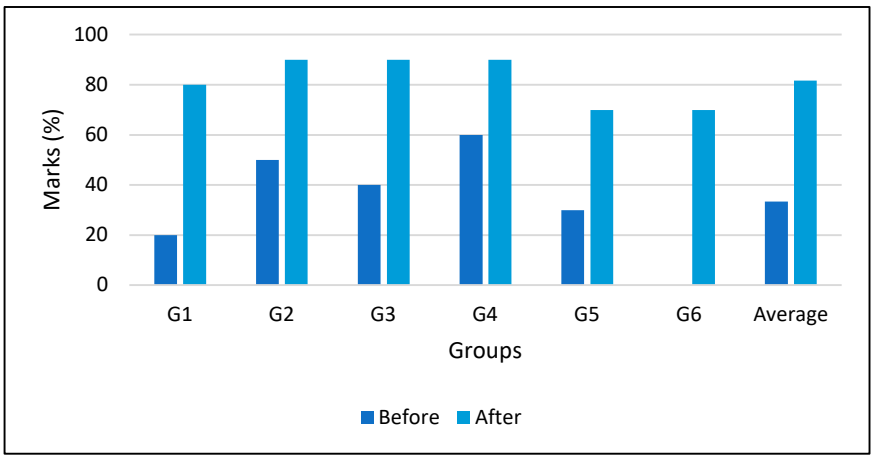

Figure 1. Marks obtained by students for the group activity before and after implementing the game-based learning activity

Table 2. Marks obtained by the students for the individual activity

Mark	Number	Percentage
7	1	3.4
8	1	3.4
9	0	0.0
10	27	93.1

Table 3 summarizes the observation at the beginning, during the group activity and during the individual activity for iconic representations. At the beginning of the group activity, some students were not enthusiastic, and their body language and facial expressions reflected this discomfort. Some students were unable to organize key concepts of the lesson and they were poorly reflecting prior knowledge and use of resources. The students asked for help frequently and one group asked to repeat how to do concept mapping even though the explanations were given before commencing the activity. However, these students followed the instructions and attempted to create a concept map. After taking much time, the students were active and had a higher level of engagement level during the group activity. The students used resources and reflected prior knowledge during the activity. The students' enthusiasm, satisfaction and visible improvements increased gradually during the activity because concept mapping is a flexible representation of knowledge which students can organize and iconically represent information in a non-linear way. Each group presented well and critically explained the links between the identified concepts. The students took an average time of 40 minutes (for all the steps in the activity) to complete the group activity.

Table 3. Summary table of observations of the activity for iconic representations

Observation	Group Activity		Individual Activity
	Beginning	During	
Enthusiasm	Somewhat	Yes	Yes
Visible Satisfaction	Somewhat	Yes	Yes
Improvements	Somewhat	Yes	Yes
Participation	Yes	Yes	Yes
Engagement level	Somewhat	Yes	Yes
Organization of concepts	Somewhat	Yes	Yes
Originality	Yes	Yes	Yes
Use of resources	Yes	Yes	Yes
Time management	No	Yes	Yes
Creativity	Yes	Yes	Yes

Use of resources	Yes	Yes	Yes
Time management	No	Yes	Yes
Creativity	Yes	Yes	Yes
Following instructions	Yes	Yes	Yes
Reflection	No	Yes	Yes
Nonverbal cues	Yes	Yes	No

After the group activity, the students were given an individual activity to create a concept map by taking a country to study on *how does the selected country use their demographics to improve their labor market planning*. The students were able to complete all the steps in the concept map under 15 minutes.

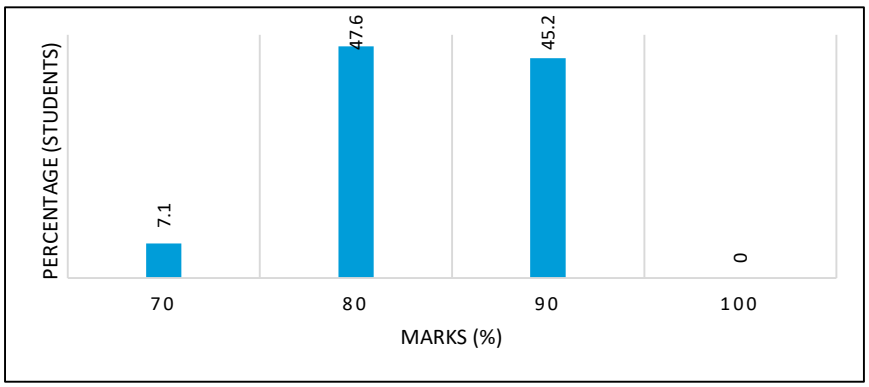

Figure 2. Marks obtained by students for the individual activity

Figure 2 presents the marks obtained by the students for the individual activity. All the students scored above 70%. Most students (47.6%) scored 80% for the individual activity. Another 45.2% of the students scored 90% for the individual activity. In considering student feedback after implementing the two activities, Figure 3 shows that 90% of the students expressed satisfaction with the game-based learning activity while Figure 4 shows that 95% of the students were satisfied with the concept mapping activity. According to Table 4, majority of the students (95.2%) stated that the concept mapping method facilitated them to identify links between concepts easily. While 92.9% of the students stated that the concept mapping method is useful to organize information and 85.7% of the students stated that this method is a good practice to use for learning, only 76.2% of the students stated that this method is useful to manage time.

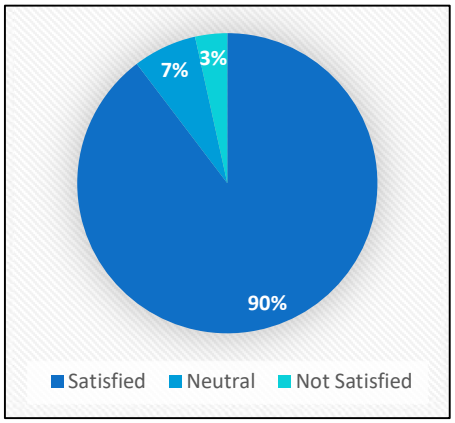

Figure 3. Satisfaction of students with the game-based learning activity

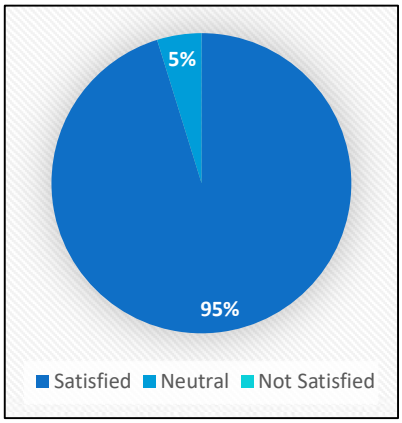

Figure 4. Satisfaction of students with the concept mapping activity

Table 4. Student feedback on the method of concept mapping

Students' Feedback	Responses*	
	Number	Percentage
Useful to organize information	39	92.9
A good practice to use for learning	36	85.7
Facilitates to identify links between concepts easily	40	95.2
Useful to manage time	32	76.2
Supports different learning styles	28	66.7
Enhances critical thinking	23	54.8

*Multiple Responses

Discussion and Conclusion

Results suggest that student learning performance and engagement increase after giving students the opportunities to practice voicing and representing their learning through enactive, iconic, and symbolic activities. These activities provided students a platform to identify academic challenges they faced during lecture hours in classrooms. The students were able to achieve the expected learning outcomes of their courses successfully through this activity.

References

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