NOVEL APPROACHES TO PROMOTE TEACHING-LEARNING ENVIRONMENT IN THE HIGHER EDUCATION

Edited By

MMDR Deegahawature, PhD

EACP Karunarathne, PhD

Staff Development Center
Wayamba University of Sri Lanka

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Forward

I am pleased to note that the Staff Development Center (SDC) of the Wayamba University of Sri Lanka continues its commendable contribution to the development of the higher education sector by diversifying its services to different arms. Especially, its contribution towards strengthening academia through publishing a series of books on contemporary themes is highly impactful towards developing human resources and sharing best practices in the higher education sector. I am delighted to provide a foreward for its seminal work in the same thread in 2022, the book published under the title of "Novel Approaches to Promote Teaching-Learning Environment in the Higher Education" edited by Prof. M.M.D.R. Deegahawature and Dr. E.A.C.P. Karunarathne. I am confident that the book certainly contributes to strengthening academia.

The series of general environmental issues, such as the pandemic and economic recession adversely influenced the smooth function of many industries, including the higher education industry forcing them to rethink their present conduct and adopt novel strategies and approaches to ensure providing the intended service. Being sensitive to the turbulent environment and its unexpected upheavals, the higher education sector has tested and successfully implemented different policies to mitigate such adverse effects. Especially, higher educational institutes and individual educators adopted several novel approaches to manage the teaching-learning environment with the aim of promoting students' achievements.

This edited book presents nineteen interesting chapters organized under four sections to discuss such novel approaches. The first section highlights the possible steps to improve the standards of the teaching-learning process. Educators and institutes can take different steps to spur learner engagement; however, the current issues demand them to adopt non-traditional and creative approaches. Therefore, the second section proposes several strategies to enhance students' engagement in the newly adopted teaching-learning environment. Facilitating students' achievements has turned out to be a critical issue due to the constraints posed by the present environment. Thus, the educators looked for novel approaches to promote and sustain the learners' achievement through technology-based tools. Hence, the third section focuses on different uses of technology to advance

learners' achievements. Moreover, though many higher educational institutes have practiced distance education, the sudden transfer to distance mode was a more significant challenge faced by many educational institutes. Focusing on that, the fourth section summarizes novel approaches to enhance the teaching-learning process of online-based distance education. Notably, several chapters discuss case studies from different disciplines giving better insight into the coverage of the sections and making the contents more attractive. I believe that policymakers, higher educational institutions, and educators will find the contents of this book useful to make the higher education system stronger and more effective in meeting its goals.

Not only as the Vice-Chancellor, but also as a person who held the position of Director, SDC for a couple of terms, I take this opportunity to congratulate the SDC for its commendable involvement in uplifting the standards and competencies of all categories of staff at WUSL and other higher educational institutions, thereby contributing to the advancement of the higher education sector in the country. Also, I congratulate the editors and the authors of the chapters, and wish all of them good luck in their future endeavors to serve the academia.

Senior Prof. Udith K. Jayasinghe
The Vice-Chancellor
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15th December 2022

Preface

Changes in the environment are inevitable and organizations consistently and continuously adopt novel strategies as a response to such changes. Though such changes were incremental in nature over the past, there were drastic changes due to the unexpected upheavals during the pandemic. The organizations faced utmost difficulties in responding to the constraints of the new environment because of a unique situation in which they had no prior experience. This new development demanded organizations to craft and implement novel strategies, approaches, practices, etc., for their survival and to maintain a minimum level of service to the market. While looking for unconventional way-out strategies, the organizations naturally tended to depend on information and communication technology (ICT) as it facilitates remote, virtual, and contactless work environments providing the perfect solution to the pandemic. Though this approach did not help much for the labor-intensive manufacturing organizations, service organizations, including the higher educational institutions were largely benefited.

The higher educational institutes tested and adopted different alternative countermeasures to facilitate their core processes and maintain the effectiveness of education. In this exercise, they exploited the strength of ICT. The institutions along with the educators, invented diverse approaches to assist the teaching-learning process. Also, those institutes had to face unforeseen difficulties due to the absence of prior knowledge and practice posing critical challenges even during the implementation. However, there are numerous lessons learned by both institutions and educators during this endeavor. These lessons are vital not only to understand how those institutes respond to the challenges posed by the pandemic but also to understand how they can respond to future challenges. Also, these countermeasures insist on strengthening the curriculum, teaching-learning practices, environment, etc., and being ready to respond to the dynamic environment and its challenges. Therefore, it is essential to disseminate the countermeasures, experiences, and lessons learned during a difficult time. Focusing on this necessity, this edited book presents novel approaches that promote the teaching-learning environment of higher educational institutes through 19 chapters under four sections.

Higher educational institutes and educators have been testing and adopting novel approaches with the aim of achieving learning objectives even in a normal environment. However, unforeseen and sudden changes in the environment demanded the institutes to look for appropriate alternative measures to continue education, creating a challenge of maintaining the standards. Therefore, the first section has been devoted to discuss the approaches to enhance the standard of the teaching-learning process. Since 2020, the higher education sector of Sri Lanka has experienced a series of challenges, increasing boredom and reducing the motivation and enthusiasm of learners. Educators adopted novel measures with the aim of mitigating these adverse effects. The first chapter presents several such novel and technology-based methods that help maintain the standards of delivery by considering the courses in the nutrition discipline as a case. Importantly, this chapter shares exciting content related to conducting exclusive online practical classes. Though the concept of blended learning was popular before 2020, it was converted to the online method of delivery during the pandemic after 2020. After the environment became normal, today, educational institutes adopt blended learning more effectively because of the lessons learned during the pandemic. The second chapter, therefore, is dedicated to discussing the benefits and challenges of blended learning along with the recommendations for its effective adoption at low, medium, and higher levels. Adding to the discussion of blended learning, the third chapter identifies it as a solution to a disordered education system. While discussing how blended learning be used to enhance the student learning experience, the chapter recognizes its mediating role and presents blended learning models, technology-based tools, evaluation of learners, and blended learning itself. The learners' achievement is a key in any education program, and educators often strive to enhance it. In this endeavor, education psychology becomes a foundation, and the fourth chapter discusses how education psychology helps create an encouraging teaching-learning environment that propels learners' achievement while presenting the benefits of educational psychology and proficient but underutilized teaching-learning techniques. Also, to meet these objectives and to lead the learners to success, a conducive learning environment is essential. The fifth chapter elaborates on several methods that help build such a conducive learning environment.

Student engagement is significant as it is closely related to academic excellence. This has turned out to be a challenge due to the recent unanticipated environmental changes. The educators endeavor to introduce untraditional measures to spur the students' engagement. Considering the need for sharing those measures with the educators the second section has been devoted to promoting the students' engagement in the teaching-learning process, and it covers the discussion through six chapters. The recent movement to online education has influenced learners' physical and

psychological health. It demands to rethink of the influence of the new environment on the motivation of learners. The sixth chapter discusses the effects and significance of motivation in an online setting and identifies reasons for lower inspiration. Also, the chapter proposes several strategies to uplift the motivation of online learners. As technology plays a critical role in education, it is essential to check how technology be used to promote students' engagement and achievement. The seventh chapter elaborates on how several advanced technologies such as artificial intelligence, augmented/ virtual reality, and machine learning be used for this purpose. Continuing the discussion in the same thread, the eighth chapter discusses innovative online teaching strategies enabling active participation and communal building. The ninth chapter identifies the factors influencing learners' attendance and the effect of the same on academic performance, taking the Faculty of Medicine of the Wayamba University of Sri Lanka as a case. Importantly, this chapter proposes positive psychiatry as a tool to increase student attendance through participation and motivation, thereby improving their performance. Switching the discussion to the ingenious techniques that enhance learners' accomplishments through an improved teaching-learning environment, the tenth chapter identifies features of and a number of such techniques. Also, the chapter justifies the benefits of modern teaching pedagogy with the use of such ingenious techniques. The eleventh chapter presents the concept of social constructivism and explains how the concept can be used to understand the roles of different elements in the education setting. The proficient performance of the role ensures the effective achievement of learning objectives.

Technology has become an integral part of human life and has invaded education making significant changes. It has effectively been used in both education administration and the teaching-learning process. The educators have introduced diverse technology-based tools to enhance and create an ideal teaching-learning process and identified their positive impact on learners' achievement. Therefore, the third section is devoted to disseminating the experience of adopting technology-based tools to advance learners' achievement through four chapters. The sudden shock due to the pandemic converted the on-site teaching-learning environment into an online, distance-based environment. The twelfth chapter discusses components of quality learning, distance learning and popular online platforms, and the use of technology in assessment. Adding to the discussion in the same thread, the thirteenth chapter proposes creative ways to engage learners and the role of digitization in managing the teaching-learning environment. Insisting on the need for well-equipped infrastructure for the effective implementation of different practices in an online environment, the fourteenth chapter elaborates on a number of practices and techniques to spur learners' achievements in a turbulent environment. Recent changes have shifted traditional classroom teaching to a new end. Also, technology

development has fueled this shift. Presenting a set of alternative, innovative, and attractive methods to create teaching environment methods, the fifteenth chapter highlights the necessity of combining educational theories to make an environment that boosts the learners' accomplishments.

Educational institutes and educators have switched to distance learning owing to the recent changes in the environment. Those changes made it compelled for the institutes to adopt distance learning as an immediate remedial measure though the interest in distance learning was burgeoning over the past. Various practices tested by the institutes and educators as a response to the dynamics of the environment invented novel methods to the world that enhance the effectiveness of distance learning while creating some challenges, such as understanding learners' performance and motivation and maintaining the quality of distance education. The fourth section discusses novel approaches in distance learning while highlighting how to ensure quality and learners' performance through four chapters. Educators have continuously tried to create an environment that facilitates an achievement-oriented learning community. The sixteenth chapter addresses this endeavor and elaborates on how an integrated approach to distance learning helps enable such a community. Strengthening the discussion, the seventeenth chapter identifies virtual reality as a better tool to create a conducive environment for distance learning presenting possible uses of virtual reality in different disciplines. Achievement of the goals of education is determined by the quality of the education. After shifting to online learning, the inevitable question was the quality of education. Considering this question, the eighteenth chapter attempts to identify the factors that help maintain the quality of education. Educators adopt different tools to understand the learners' performance and use those tools to motivate the learners. This has become critical and challenging as previously adopted tools were inappropriate in the new environment. The nineteenth chapter presents several tools appropriate for the assessment of the performance of learners, thereby motivating them in the present environment.

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Acknowledgment

It is our duty to extend our appreciation to all those who help us bring this book out. First, we are greatly indebted to Senior Professor Udith K. Jayasinghe, the Vice-Chancellor of the Wayamba University of Sri Lanka, for his insightful forward and all his encouragement and guidance throughout this publication process. As a senior consultant and expert in academia, his words add immense value to the book. He deserves special thanks for his distinct service in uplifting the standards in staff development in academia.

Also, we reserve a special thanks to all the resource persons of the Staff Development Center (SDC) and senior academics for their encouragement and their contribution to uplifting the standard of young academic staff, thereby enabling them to come up with novel ideas and practices to advance the higher education sector.

There are many pillars behind the success of this book. We note the support that we received from the members of the SDC, including Ms. Maheshi Anupama. Also, we are grateful to Dr. AD Dharmawansa for the cover page design, and Ms. WISN Fernando for typesetting and compiling the book nicely. Also, we extend our appreciation to the owner-manager and staff of the Warna Printers, Kuliyapitiya. Finally, we extend our gratitude to all authors for their untiring effort to finalize the impactful chapters.

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15th December 2022

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Section 01

Approaches to Enhance the Standards of Teaching-learning Process

CHAPTER 1

Smart Teaching-learning Approaches to Maintain the Standards of Delivery: Experience of Nutrition-related Undergraduate Programs

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Introduction

Sri Lanka has been facing difficulties since 2020 to date, starting from the Covid-19 pandemic to the present economic crisis. The turbulent environment, which had affected every aspect of life, had equally undesirably affected the smooth functioning of the University education system. However, the universities are obliged to provide specified knowledge, skills and values as defined in the graduate profile. Thus, in order to function the university education amidst all the upcoming challenges, novel approaches in teaching-learning are being practised. With the enforcement of travel bans due to the Covid-19 pandemic and due to the unavailability of fuel in due to the economic crisis, university education had been restricted to distant learning methodologies among which online lectures being the most prominent. However, among the several drawbacks of distance education inability of the teacher to interact with the students, lack of motivation for the student and inability to conduct practical sessions are noteworthy. Modifications in novel approaches must be planned in order to continue the academic activities without interruption to ultimately mold the desired, fully-equipped graduate. As the students continuously stay at home, they eventually feel bored and unmotivated, which should also be addressed with proper strategies.

Online Classroom and Online Courses

Video conferencing platforms for remote working were spotted during the pandemic, namely, Zoom, Microsoft Teams, Skype, Google Meet and WebEx Teams among others. Zoom is the most popular with over 200 million daily users. Massive Open Online Courses (MOOCs) such as Coursera, edX, Udacity and others had been available for several years, offering open-access programs with verified content[1]. The students can be encouraged to follow certain sections of lessons from MOOCs as a means of self-learning. Learning solely through online videos makes the students unmotivated and bored. Therefore, it will be fascinating if the teacher can make use of interactive technological tools such as social media and online discussions, and technology-enhanced assessments to motivate the student. Interactive tools such as Edpuzzle, Nearpod, Padlet, Mentimeter and Kahoot can improve teacher-student coordination during online lectures. In addition to providing basic knowledge through online platforms, further enhancement in student involvement can be achieved through smart teaching-learning approaches discussed in the chapter.

Inquiry-based Learning

The level of participation of every student in lectures is not the same. Some students are enthusiastic and respond well while others struggle with structured classes. Paying individual attention to students is further limited in the online mode of classes. However, certain students who seem disengaged during lectures may find themselves motivated by alternative teaching styles and by their own projects or hands-on lessons. Non-traditional approaches to motivate unenthusiastic students simply include alternative teaching styles, extracurricular activities, and the use of technology.

Inquiry-based learning, as the name implies, is a student-based inquiry technique where the students utilize their analytical skills to find solutions to a real-world problem rather than memorizing the facts. This can be remotely carried out by the student at a setting closer or convenient to them, without necessarily attending the university[2]. In the conventional university teaching-learning process, solving nutrition-related problems in the community can be done through tutorials or imaginary case studies. Inquiry-based learning allows the student to attend the nearest hospital or clinic to collect and observe real cases. The students will get the opportunities to speak to patients, assess their disease status, collaborate with the hospital staff to gather additional knowledge and to practically observe how a patient is being treated. The student then receives a more practical and effective approach to solving the problem. Occasionally, the student can collaborate with the teacher and peers through online platforms to get their inputs in solving the problem. Inquiry-based learning can also be

accomplished by finding cases from home itself. The students can assess the nutritional status of their own family members and neighbours and provide nutritional counselling and plan diets for them. This is a more effective way of learning rather than the teacher giving imaginary case studies in the class. An incorrect diet plan can be prepared for an imaginary case, but not for a real scenario as it will cause a huge risk to human life. The responsibility attached when dealing with real cases motivates the students to create more reliable outcomes. The feeling that their effort is worthwhile to heal a patient motivates the students further. However, inquiry-based learning is successful only when the curriculum is aligned with the knowledge outcomes and context of real-world problems or situations, and when the students get frequent opportunities for collaboration.

The importance of inquiry-based learning in nutrition-related teaching can be listed as follows.

- Support autonomy, independence in thoughts and actions, in approaching the problem or task
- Facilitates student choices based on their interest
- Provide opportunity for students to make use of novel technology as they desire
- Improve student-student and student-teacher collaborations
- Develop confidence in handling real-life cases alone

Service Learning

Service learning is another approach to motivate unenthusiastic students. It integrates community service with academic study. This is an opportunity for the students to utilize the theories learnt in the classroom to provide a message to the community, thereby making the students feel that the theories they learn are important for the betterment of society. It is considered as one of the best tools to motivate a reluctant learner. The students can visit schools, pre-schools or households in their own village to identify lapses in nutritional status. Interventional projects can be planned and implemented using suitable strategies. Posters, seminars, flyers and newspaper articles are some conventional knowledge-disseminating options. Due to the difficulties in physically meeting and owing to the advancement in technology, novel approaches such as webinars, social media pages, panel discussions using online platforms, e-documents, blogs, websites, e-newsletters, videos and video games can be planned. As the new generations are more familiarized with new technologies, they will be inspired to use their own expertise for academic purposes. Also, these community services can be carried out in the form of mini-projects attached to the academic schedule. By giving the students the ownership over a project, the feeling of autonomy is increased. Instead of providing the task of writing assignments, these novel approaches will be of high use to get a

similar task out of the students in a more effective manner. By connecting the content of curricular to problems in the community, and by providing opportunities to experience the interconnectedness between the curriculum and the real word scenarios it can foster competence and value.

Benefits gained by students who involve in service learning of nutrition subjects are as follows.

- Assist in development of character, personally and socially
- Increase civic engagement and connect with the community
- Having engaged in community services strengthens the curriculum vitae
- Support autonomy by providing ownership over a project
- Strengthen the bonds between students and their communities, among the group of peers, and between students and teachers

Exclusively Online Practical Classes

In addition to inquiry-based learning and service-learning, there are alternative techniques to motivate students during the present turbulent environment. With the emergence of the Covid-19 pandemic and travel restrictions, the teaching-learning process became exclusively online. Although it was possible to continue lectures on online mode, conducting practical classes and field visits became a huge challenge. Alternative approaches for field visits can be introduced. Instead of hospital visits organized for the whole class, individual students can be asked to visit the nearest hospitals or clinics in their hometown. Visits to large-scale companies can be revised to visiting the nearest small-scale production sites by individual students.

It is difficult to provide hands-on experience through online sessions. Novel educational strategies of demonstrating practical sessions exclusively online with the help of pre-recorded videos are in use. Researchers at Charles Sturt University have conducted a study on the effectiveness of online-delivered anatomy practical classes. A series of 20 pre-recorded videos, at 720P resolution, were uploaded to the Learning Management System (LMS). Furthermore, students were given a weekly online quiz using LMS and Kahoot. An online survey conducted to collect the students' feedback on the above teaching strategy revealed that 89% of students reported a substantial learning experience from the videos[3].

Online laboratories using computer models, adaptive learning, and videos to remotely conduct experiments are in use. There are two novel approaches to conducting laboratories online, namely, virtual and remote labs. The virtual lab is based on software to simulate the lab environment while the remote lab is an experiment which is conducted and controlled remotely through the Internet[4]. For example; advancement in technology has led to the establishment of Virtual anatomy laboratories equipped with

components including 'Anatomage virtual cadaver tables' displaying life-size virtual cadavers, allowing students to view gross anatomy in axial, sagittal, and coronal slices with control over the clipping plane; radiology workstations where the students can access patient images, including X-rays, and scans; and ultrasound sessions providing the students with hands-on experience on the surface and internal anatomy.

Participation in Conferences and Webinars

With the emergence of travel restrictions, the majority of the international and local conferences started holding their sessions over virtual platforms, thereby waiving or considerably lowering the registration fee. This opened the door for student researchers from low and middle-income countries to participate and present their research findings in such conferences, which will cause a huge positive impact on their lives. Seminars had taken the online form of webinars as an impact of global travel restrictions, thereby providing easy gathering of experts worldwide and opening opportunities for students to participate in such events free of charge. Participation in such events provides a huge motivation to prospective student researchers while providing them with opportunities to interact with experts in the same discipline and get exposed to new knowledge.

Research and Surveys

Conducting research had become another challenge owing to travel restrictions. Population-based surveys are a common data collection methodology used in nutrition research. With the advancement of technology, data can be collected from a larger sample at a minimum cost and effort. Besides the difficulties in conducting clinical research involving human participants and difficulties in accessing laboratories, research can be continued in the form of online surveys. Students should not be discouraged by the new adoption as nutrition and health surveys result in enlightening findings, ultimately providing information for evidence-based nutrition policy planning.

The benefits of using online surveys for nutrition-related data collection can be listed as follows.

- Convenient and faster data collection
- Saves time
- Access to a wide variety of participants from various geographical locations
- Survey tools provide automatic data retrieval into data sheets; eg: Google sheets
- Data can be easily transferred into specialized statistical software or spreadsheets

- Accurate and lack of errors
- Data can be password-protected
- User-friendly for participants

Peer-teaching and Peer-learning

Peer teaching is a team-based teaching-learning process where the student to student interactions promote active learning. Informal sessions of peer teaching and learning had been a part of the university culture. The same concept can be converted to formalized peer-assisted teaching and learning, thereby facilitating the students to discuss, debate, question or criticize subject content among peers to better digest the content. The lecturer can involve in providing instructions and guidance, where necessary and making sure that the program is progressing as desired. The peer-teaching mechanism, although carried out online, is expected to provide benefits such as enhancing the students' engagement and independence skills, promoting critical thinking and increasing the understandability of the course content when delivered by a colleague. Benefits are identified separately for peer teachers and peer learners.

Benefits for peer teachers

- Enhance the confidence
- Improve leadership qualities
- Self-satisfaction associated with helping the colleagues
- Experience can be listed on the resume

Benefits for peer learners

- Create an environment for students to learn in small groups
- Improve teamwork skills
- Provide opportunities to question and clarify the content
- Facilitate the understanding of course content
- Enhance self-reliance and self-confidence

Summary

The majority of students are demotivated and bored by the traditional system of classroom teaching. With the travel restrictions resulting due to the Covid-19 pandemic and the economic crisis, in-person lectures had been converted to online classes leaving the unenthusiastic students further uninvolved in the academic program. The chapter was intended to identify some of the novel and technology-based approaches that can be used in the teaching-learning process of nutrition-related subjects to maintain its standards of delivery. While conducting classes through video conferencing platforms, interactive tools can be used strategically. Inquiry-based learning and service-based learning are two motivational approaches towards effective teaching and learning. Cutting-edge solutions are being

used in the world to conduct practical classes online. The ability to participate in overseas conferences and the convenience of conducting surveys are involuntary benefits linked to the novel technologies. Peer teaching and learning, although not a new concept, it can be remodeled under online platforms to benefit the learners.

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CHAPTER 2

Blended Learning: Benefits, Challenges and Recommendations

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What is Blended Learning?

Combining the efficiency and sociability chances of the traditional face-to-face classroom with the educational potential offered by the online method of delivery is known as blended learning. This method's characteristics include (a) student-centred instruction, which requires all students to engage with the material actively; (b) increased opportunities for interaction between students and faculty; students and additional learning materials; and (c) opportunities to gather formative and summative assessment to enhance course offerings. A blended course mixes in-person instruction with online readings, assignments, and resources to provide students with the best of both worlds.

A key component of a blended course is that online resources are not utilized to replace face-to-face instruction; rather, they are meant to supplement and advance the material covered in class. Although the terms blended and hybrid learning are sometimes used interchangeably, there is a difference because hybrid courses incorporate online components to replace in-person class time. In a hybrid learning environment, students can connect online either synchronously (using real-time meeting sessions) or asynchronously (where they interact at various times).

History of Blended Learning

Technology has altered how higher education is perceived. Initially, the only method of training where the instructor and pupils actually met in

person was traditional face-to-face learning. Due to the ability of students to complete their coursework asynchronously without travelling to campus or being physically present in a classroom, online learning also began to gain popularity during the 1990s.

It's also crucial to remember that academic officials believed online education could take the role of in-person instruction because it offered students an affordable alternative. Due to this, there was a greater drive to expand the number of online course offerings in the mid-1990s. Online education was less successful than anticipated despite greater efforts to introduce more courses because learning was essentially a passive activity.

Blended learning is a third kind of teaching that has gained popularity among academics and educators over the time. This approach will combine the best elements of numerous technologies, web-based apps, and learning theories (online and traditional face-to-face teaching). Research indicates that combining on-campus and online work can be more advantageous and fruitful than doing either one alone. Blended learning has the ability to expand their options since it allows them the much-needed freedom to proceed at their own pace while also enabling them to take part in in-person education frequently.

Evolution of Blended Learning

Evidence from the past suggests that students who finish coursework utilizing a hybrid or blended modality (a combination of in-person and online instruction) outperform peers who may only have access to one type of instruction. Faculty and academic leaders have a creative choice with blended/hybrid learning to make knowledge available to students even outside of the classroom's four walls. This enhances and maximizes each student's productivity during face-to-face lessons.

Sir Issac Pitman introduced the first distance learning course in the 1840s, which is when blended learning first became popular. Students received shorthand texts through postcards, which they were asked to complete and return for grading and comments. It is significant to highlight that, despite the absence of computers and mobile devices, feedback and review were quite significant. Employers were able to train multiple staff using computers in the 1960s and 1970s. Employees finished their training without travelling or attending in-person live sessions for the first time, making this a groundbreaking shift.

In the 1970s and 1980s, a lot of firms used video networking to train their employees. Students communicated, observed lessons, and, if necessary, asked clarifying questions using technology. The teachers were able to complete numerous training and educational programs without having to travel to the employment site thanks to this. This method of training is comparable to the early versions of today's webinars and online video

courses. Stanford University, one of the forerunners in the field of online education, utilizes video networks for its teaching and learning processes. As a result, instructors may easily travel between different places to offer classes. Students were advised to upload their papers online rather than send them through the mail or a courier.

Advancements in the field of hybrid learning methodologies have been made possible by technology. Employers and academic institutions started utilizing CD-ROMs that could hold more data. The use of these new technologies gave students more engaging learning opportunities. Computer-based courses were also used to give "live" content in an online setting. At the same time, the first Learning Management System (LMS) was released, enabling organizations to track and monitor learners' progress as they finished the course.

Online learning, particularly blended learning, has seen tremendous transformation during the last two to three decades. The first set of instructions based on the internet was introduced to the world in early 1998. As more families and businesses began to buy computers, particularly personal computers, for higher education studies, leisure time activities, and work-related activities, these devices were no longer considered a luxury. Companies began to post educational materials to web-based platforms so that anyone in the globe could access them (even in remote and rural locations). This revolution altered how businesses operated, and even traditional CD-ROM creators realized that existing online content, such as enormous video files, needed to be modified to match learners' demands.

As time has passed, we have reached a new era of blended/hybrid learning. This kind of material delivery has a track record of fusing several forms of instruction to make learning a more interesting and dynamic process. Students now have access to a wealth of materials thanks to technology, including webinars, tutorials, and other technological tools. The ability to accommodate students' shifting schedules and provide training opportunities in a more flexible format is available to instructors.

Sub-design Strategies of Blended Learning

The definition of "blended learning" as applied by an instructor typically serves as the foundation for course design. Because it influences how blended learning courses are created, defining blended learning is important. Because they see it as an easy way to mix traditional learning with web-based online approaches, many instructors supplement their regular face-to-face classes with additional online activities, which they refer to as blended learning. Researchers were able to distinguish three main design methods by looking at several blended learning course design processes:

(1) Low-impact blend: enhancing an existing course with new activities.

(2) Medium-impact blend: substituting new activities for those in an existing course.
(3) High-impact blend: starting from scratch to create the blended course.

Low-impact Blend: Adding Extra Activities

Regular face-to-face training is supplemented with additional online activities as part of the low-impact method. Most professors creating blended courses add online components without removing any of the existing activities from their traditional courses. This condition was referred to as "the course-and-a-half syndrome". Novice teachers frequently create their first blended learning course by adding additional online activities to an already established course. These teachers try to take advantage of blended learning without making an effort to completely rethink the course objectives within the framework of a blended learning paradigm by just adding more material to their existing courses.

Benefits of Low-impact Blending:

(i) A simple method for creating blended learning courses that can persuade reluctant teachers to give it a try. Teachers who could benefit from blended learning may be hesitant to give it a try because they believe it to be overly complicated and extremely technical.
(ii) A successful technique for developing a mixed learning course. Without spending additional time and effort considering and re-planning the entire course or researching the various blended learning components and delivery techniques, teachers who are driven by a specific pedagogical demand may add a new activity right away that fits that need.
(iii) Little likelihood of failure when utilized correctly. Teachers who have taught blended courses have identified three key risk factors: concern about student assessments, concern over losing control of the course, and confusion over the impact of online learning on interpersonal connections in the classroom. By adding additional activity while essentially keeping the regular course, it is possible to reduce these risks. Designing a blended course only requires minimal traditional course teaching knowledge. Even a novice instructor can identify the course material that would benefit from additional online activity.

Challenges of Low-impact Blending:

(i) Since there is no turning back to the old way of teaching, teachers need to have a solid understanding of technology and some confidence to use this strategy. While having technological knowledge is necessary to

support students' learning, it is insufficient if the instructor lacks confidence in applying such information.

(ii) To create the blended course, a dedicated amount of time and effort must be put into replacing and integrating new course components.

(iii) There are no established guidelines that can be used to make decisions about how much or what portion of courses can be substituted. Numerous factors, including the course's objectives and the instructor's intents, have an impact on these choices.

(iv) It helps to have prior experience instructing the conventional course. When creating a blended learning course utilizing this method, one of the biggest challenges is figuring out which components of the course don't work well in the conventional format and then deciding whether they would perform better online. Doing this with little or no prior knowledge in the field is challenging.

(v) There must be substantial long-term planning, monitoring, and course evaluation in order to guarantee a successful implementation. Finding a good balance between online and in-person components needs a gradual process of replacing existing components with new tools or techniques, and then determining whether using these tools or techniques is helping students achieve their learning goals.

Recommendations for Low-impact Blending:

(i) The replacement strategy should be used by teachers gradually. They should begin by shifting a small portion of their course material to the online environment, cut back on in-person instruction time correspondingly, and scale as needed until they achieve a harmonious balance between in-person and online learning.

(ii) The symbiotic equilibrium will change from course to course. There are variations because of a variety of things, including as student characteristics, teacher experience, teaching methods, course objectives, and the accessibility of online resources. In some courses, it will be more acceptable to spend more time in person than online, whilst in others, the emphasis will be more on the online components. Still, other courses will mix the two styles of instruction roughly evenly.

(iii) Constant review and routine course evaluation are required to achieve a harmonious equilibrium. Iterative course redesign should consider evaluative feedback as a key success element for course improvement. In order to achieve this balance, teachers' cumulative design experience for blended learning is helpful. Also, achieving a tradeoff between in-person and online components is challenging and requires experience.

(iv) Teachers who have had medium- to long-term prior experience instructing the conventional course can successfully implement this

strategy. Many important decisions will be taken during the replacement procedure, including how much or what portion of the courses can be replaced. For the instructor to make the best choices, experience is crucial.

(v) This method needs intuitive backing to be effective. The effectiveness of the blended learning experience depends on providing technological assistance, considering teachers' schedules, and resolving their concerns and resistance to blended learning. The importance of professional development for instructors in order to help them master new technology and teaching techniques and to help them choose the best delivery options for their courses. Educational designers can also be very helpful in advising about the many technologies that are accessible as well as the benefits and drawbacks of employing each.

Medium-impact Blend: Replacing Activities

The medium-impact strategy involves redesigning an existing course by substituting some in-person components with online ones. This strategy is predicated on the idea that some course components might function better as online exercises. The remaining face-to-face sessions are occasionally retained precisely the same, while at other times the in-class activities undergo some adjustments.

Benefits of Medium-impact Blending:

(i) Using this strategy, teachers can replace course components as necessary and introduce gradually at first.

(ii) The knowledge obtained from employing this strategy can boost instructors' confidence in leading a blended learning course.

(iii) An effective strategy for educators who have some experience creating for blended learning but do not want to take the risk of making large course changes. Teachers typically prefer to instruct in the same conventional manner with which they are familiar and at ease and find it difficult and challenging to devote a sizable amount of time and effort to develop a new course.

(iv) Provides teachers with continual opportunities to experiment with new forms of instructional technology without sacrificing the full advantages of the conventional course. Also, acquiring the skills necessary to use technology properly and efficiently is difficult but can improve with practice.

Challenges of Medium-impact Blending:

(i) Since there is no turning back to the old way of teaching, teachers need to have a solid understanding of technology and some confidence to use

this strategy. While having technological knowledge is necessary to support students' learning, it is insufficient if the instructor lacks confidence in applying such information.

(ii) To create the blended course, a dedicated amount of time and effort must be put into replacing and integrating new course components.

(iii) There are no established guidelines that can be used to make decisions about how much or what portion of courses can be substituted. Numerous factors, including the course's objectives and the instructor's intents, have an impact on these choices.

(iv) It helps to have prior experience instructing the conventional course. When creating a blended learning course utilizing this method, one of the biggest challenges is figuring out which components of the course don't work well in the conventional format and then deciding whether they would perform better online. It is challenging to do this with little or no prior knowledge in the field.

(v) There must be substantial long-term planning, monitoring, and course evaluation in order to guarantee a successful implementation. Finding a good balance between online and in-person components needs a gradual process of replacing existing components with new tools or techniques, and then determining whether using these tools or techniques is helping students achieve their learning goals.

Recommendations for Medium-impact Blending:

(i) The replacement strategy should be used by teachers gradually. They should begin by shifting a small portion of their course material to the online environment, cut back on in-person instruction time correspondingly, and scale as needed until they achieve a harmonious balance between in-person and online learning.

(ii) The symbiotic equilibrium will change from course to course. There are variations because of a variety of things, including as student characteristics, teacher experience, teaching methods, course objectives, and the accessibility of online resources. In some courses, it will be more acceptable to spend more time in person than online, whilst in others, the emphasis will be more on the online components. Still, other courses will mix the two styles of instruction roughly evenly.

(iii) Constant review and routine course evaluation are required to achieve a harmonious equilibrium. Evaluative feedback should be considered during iterative course redesign as a critical success factor for course enhancement. Teachers' cumulative design expertise for blended learning can be very useful in achieving this balance. Further, achieving a successful balance between in-person and online components is challenging and requires experience.

(iv) Teachers who have had medium- to long-term prior experience instructing the conventional course can successfully implement this strategy. Many important decisions will be taken during the replacement procedure, including how much or what portion of the courses can be replaced. For the instructor to make the best choices, experience is crucial.

(v) This method needs intuitive backing to be effective. The effectiveness of the blended learning experience depends on providing technological assistance, considering teachers' schedules, and resolving their concerns and resistance to blended learning. Additionally, educational designers may be of great assistance in providing guidance on the various available technologies as well as the advantages and disadvantages of using each one.

High-impact Blend: Building from Scratch

The blended learning course is created from the ground up with the high-impact method. This strategy has been defined in the literature in a variety of ways, including radical change, entire redesign, and full redesign. Under this strategy, the instructor examines each individual course learning outcome rather than the course as a whole. The instructor must choose the most effective delivery method for each outcome. Through this, teachers may obtain the most efficient combination of technologies and create a better curriculum. This strategy adheres to the typical curriculum creation concept known as constructive alignment, in which assessment tasks are coordinated with learning objectives. A new course should be created entirely from scratch rather than worrying about old programs, and it should be noted that it is incorrect to believe that reworking an existing course will take less time than creating a new course.

Benefits of High-impact Blending:

(i) Offers a chance to improve the current course and lessen or resolve any issues that may exist. Teachers who approach the subject from a new angle have a better chance of developing excellent lessons, especially when the conventional approach has certain issues.

(ii) Enables more effective face-to-face and online integration. In order to effectively integrate face-to-face and online components, the course must be built from the ground up.

(iii) Provides teachers with the chance to fully benefit from blended learning and better fulfil their students' requirements. The opportunity to rethink and restructure the entire course with the demands of the learners is better when the course is built from the ground up. The effectiveness of the courses will rise since teachers will have a greater range of delivery methods to choose from.

Challenges of High-impact Blending:

(i) To properly implement this strategy, a high level of technological confidence and understanding is required. Teachers that possess a high level of technological competency can quickly pick up new digital tools and employ them in their lessons. One of the most important variables influencing teachers' use of technology is their belief that it will enable them to carry out their instructional objectives more effectively.

(ii) The method has a larger risk of failure than the other methods since students might be introduced to a brand-new, untested course as a result.

(iii) A wide range of potential blended learning components must be considered by teachers, together with their full ramifications. Teachers encounter challenging circumstances and consequent pressure while revamping their courses due to the broad diversity of delivery methods, technological combinations, and lack of available exemplars.

(iv) Requires prior knowledge in blended learning design. Teachers who lack the essential theoretical understanding and practical expertise would find it challenging to fully utilize blended learning. Teachers can better comprehend how technological media are related to teaching by becoming familiar with it and gradually experimenting with blended learning.

(v) Planning and building a new blended learning course take a lot of time. Creating a blended course may require two to three times as much time as creating a course in the conventional style.

Recommendations for High-impact Blending:

(i) In order to gain knowledge that will be helpful when implementing this method, teachers who are unfamiliar with or have little experience with blended learning design should first try one of the other two techniques. When creating a blended learning course, choosing the best learning activities taught in the classroom and those that must be prepared for online learning requires a great deal of knowledge and expertise. Not using the greatest teaching resources is one of the worst teaching methods for a blended course.

(ii) Teachers should be ready to devote a significant amount of time to the design. Teachers should give themselves a considerable lead time for course planning. Full course design for blended learning courses takes time. Lack of time is the biggest obstacle to implementing a successful blended learning experience.

(iii) Teachers ought to think about blending several delivery methods. E-learning is most successful when it combines a variety of distribution methods.

(iv) Institutional support has a substantial impact on the strategy's success. A complete course design is necessary to ensure an effective blended learning experience. A high level of institutional support in the form of time off, professional development, funding, and technical assistance is required to make this happen. Given the numerous online components that need to be considered, instructors should obtain professional development that focuses on the proper use of new educational technology that teachers have never used before. Educational designers are vital in analyzing new courses in addition to providing advice during the development phase.

Summary

This chapter presents a comprehensive discussion on the strategy of blended learning based on two[1,2] main publications. There isn't a single definition for blended learning that is widely accepted. Although this may seem like an intellectual argument, the effect is that it enables professors and course designers to create their own definitions of the term in the context of their institutions or courses and then use those definitions as the foundation for creating blended courses. The numerous definitions of blended learning led to the emergence of three distinct methodologies for building blended courses (low-impact mix, medium-impact blend, and high-impact blend), which were identified in this research.

In view of prospective changes to the current instructional technique and learning environment, this classification has been developed. The main recommendation is that teachers should start with the low-impact approach if they haven't already, progress to the medium-impact approach as they gain more experience, and only try the high-impact approach once they've gained enough confidence, expertise, and experience in blended learning design. The overall course objectives should be reviewed with the needs of the learners in mind as the final purpose. The course can be entirely rebuilt from scratch to more easily accomplish this goal. With such a strategy, teachers can begin from scratch, rethinking the entire course and potential delivery methods to incorporate, all while keeping the requirements of the students at the forefront of their minds. Going straight to the high-impact combination, however, carries danger and may result in a failed course. Inexperienced blended learning teachers will confront extremely difficult problems and consequent strain while completely rebuilding their courses due to the broad diversity of delivery methods, technological combinations, and available models. By learning more about technology and gradually experimenting with blended learning, teachers can get more confidence and understanding about how electronic media can be included in the traditional face-to-face experience to better meet the requirements of their students. Applying the medium-impact blend is another option for achieving the

objective, although it can take a while. Teachers can create a long-term redesign strategy that will enable them to cover all course components in the future and determine whether a traditional face-to-face delivery method is preferable to an online one for a given component.

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CHAPTER 3

Adopting Blended Learning for Enhancing the Student Learning Experience

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The Wisest Investment for a Bright Future

Nelson Mandela, former president of South Africa and a prominent world leader who realized the greatest values of the United Nations, once said "Education is the most powerful weapon which you can use to change the world". This well-known phrase emphasizes the importance of education. Sri Lanka is one among a handful of nations that offer free education from Primary Education to Higher Education. This is one of the major reasons that positioned the country at the top in South Asia considering a youth literacy rate of 99.0%[1] despite the scarce resources and assets.

Due to the Covid-19 pandemic and the current economic crisis in Sri Lanka, the country's education system is facing a terrible dilemma. Education is a fundamental human right that acts as a catalyst for the growth of a nation. Moreover, it is one of the most effective methods of eradicating poverty and fostering peace, harmony, gender equality, stability, and wellness[2]. Therefore, the disruption to the education system would leave the goals, policies, human capital, and overall the whole future of the country in jeopardy. However, in an attempt to minimize the impact, the education system in Sri Lanka has accommodated online and distance learning as a consequence of the Covid-19 pandemic and economic crisis over the past two years.

Impact of Online and Distance Learning

Online learning or distance learning has a reasonable amount of benefits if the appropriate tools and technologies are acquirable. With the utilization of Learning Management Systems (LMS), the young generation in tertiary education have the opportunity and convenience to access lecture material and resources at any time of the day from anywhere. Further, it allows the students to control their learning experience, provides them with greater responsibility, and builds them into independent learners before they step into the real world.

Although Higher Education has incorporated several technologies and tools, the other four levels in Sri Lankan Education System including primary, junior secondary, senior secondary, and collegiate have not employed them sufficiently. Therefore, online teaching and distance learning has become less beneficial in those four education levels in the country.

In addition, the students experience difficulties in connecting and acquiring online delivered content caused by the poor telecommunication network coverage in Sri Lanka[3]. This problem is amplified as moving toward far remote areas. Subsequently, the lack of knowledge and hands-on practice related to novel computer-related technologies and tools among both students and teachers has also posed a negative impact on online learning. Furthermore, insufficient infrastructure facilities in educational institutions to integrate modern technologies have also become unfavorable for adopting online teaching. Significantly, youngsters from low-income households were unable to successfully engage in remote learning as a result of the scarcity of electricity, network connectivity, and technological devices. Differently abled children have also experienced impediments in remote learning[2].

The main visible disadvantages of online learning or remote learning include social isolation and inadequate development of communication skills which in turn affect the social skills developed in a young adult who is stepping into the industry[4]. The development of vital social skills such as coordination, negotiation, persuasion, service orientation, and social perceptiveness that aid to build harmonious relationships among an individual and a superior or peer, or subordinate would be at a stake[5].

Overall, despite numerous benefits, online and distance learning has introduced new circumstances to the education field in the country relative to the traditionally practiced offline teaching and learning.

Blended Learning as a Mediator

Recently, education institutes have been encouraged to adopt blended learning, which combines the on-campus offline learning experience with the online learning experience[6]. Nevertheless, the essence of blended learning is not practised effectively in the country.

Blended Learning is also termed hybrid learning since it integrates online resources and possibilities for online engagement with traditional brick-and-mortar classroom learning methods. It will remain the advantages of e-learning while minimizing its disadvantages due to the incorporation of in-class interactions.

According to the literature, this would enhance the student learning experience and would be a catalyst for the evolution of higher education institutes guided by ever-changing expectations[7]. Flexibility is one of the prominent benefits provided by hybrid learning that gives students greater control over their learning and growth by allowing them to learn whenever it is convenient for them. Persistent accessibility to learning materials and the possibility to incorporate a variety of educational resources such as videos, quizzes, podcasts, articles, and more are some other plus points. Further, hybrid learning is also comprised of merits of place-based classroom teaching, including facilitated teacher-learner interaction, student follow-up, face-to-face group work and communication, and interaction among peers.

Even though the approach of blended learning is moderately new to Sri Lanka, it has been in the vicinity and several other nations have been accustomed to it for quite a bit of time. While western culture is utilizing hybrid learning, several Asian countries, namely South Korea, Singapore, and Bangladesh, have been adopting it amidst numerous circumstances[8].

One of the dominant reasons for adopting this learning approach is the ability to cater to a vast student population cost-effectively[7]. It will be undoubtedly advantageous in consideration of the economic contingency faced by the country at the moment. Further, in Higher Education, hybrid learning will allow learners, who find classroom-bounded education challenging due to reasons such as time constraints and geographical constraints, to engage in their learning process conveniently. Moreover, the majority of the learners in Higher Education at present belong to human generations, namely Millennials and Gen Z, who are well known to be characterized by a strong fondness for technology. Therefore, combining technology-driven online learning with brick-and-mortar learning would minimize boredom and boost the effectiveness of the learning process.

Despite all these positive effects, the participation problem is a significant issue in blended learning. In addition, scarcity of technical equipment and internet access required for accessing online learning platforms, lack of caregiver support due to limited information technology knowledge, shortage of infrastructure, and inadequate government policies are pitfalls in employing blended learning.

Blended Learning Models in Practice

Blended learning can be implemented in different ways. Online learning often makes up 60% to 90% of blended learning, with classroom-

bound learning making up the remainder. Furthermore, six models have been identified to successfully bring the Blended Learning approach into action[9]. These models, along with their pros and cons, are shown in Table 1.

It is impossible to choose one blended learning over another since every educational institute has distinct requirements and resources. Therefore, academic experience, LMS metrics, and student feedback need to be considered when selecting a model.

As per the published works, the teacher's competence to effectively plan, create, and implement the blended learning process determines its validity[7]. Moreover, restructuring and replacing the traditional offline hours with online hours and redesigning the courses and modules to boost student engagement need to be realized to achieve the intended success in this teaching-learning approach.

Role of Technological Tools in Blended Learning

Introducing state of art physical technological equipment into the classroom only is inadequate to develop a productive blended learning system. It also needs to include systems such as Learning Management Systems, software such as word processors, services like YouTube, and high-end technologies like virtual reality and simulation environments along with the hardware and networks[10].

Table 1: Blended Learning Models

Model	Approach	Benefits	Drawbacks
Face-to-face driver model	The major method of instruction is classroom bounded & each session ends with homework or assignments that must be finished before the upcoming session. This approach has many similarities to a conventional classroom.	particularly effective for students who require additional support in specific areas, who have less technical skills, & for freshers	requires more time & effort from the teacher
Flipped model	Comparable to the Face-to-face driven model & additionally before each classroom engagement, students receive learning aids & materials typically supplied via an LMS.	Successful for learners who need additional support & for freshers, improve student engagement, learners can prepare for the session beforehand	requires more time & effort from the teacher
Enriched virtual model	Learners can join interactive sessions to suit their needs, & the majority of their curriculum can be completed online.	Good for self-motivated learners who admire independent learning. It enables students to control the speed of their learning	Often not successful for freshers

Flex model	The students can decide & switch between group learning, individual assignments, & both synchronous & asynchronous education. Instructors are accessible to respond to inquiries and give feedback.	Good for self-motivated students, a personalized learning experience, students can identify the most effective teaching & learning techniques	Teachers must be available at any time, unmotivated students mostly depend on the instructional approach of teachers
Rotation model	Students are grouped & switched between group instruction, individual learning, & self-directed assignments, & the teacher determines which learning methods to be utilized	Provides students with a mixture of self-directed & instructor-led learning	Requires a high level of organization, & heavy use of a LMS
Online driver model	Provides the most learner independence possible, students can control their speed of learning & can communicate with the teachers when needed	requires the least amount of time and effort from the teacher, is effective for self-motivated students, personalized learning experience	Unmotivated students could become confused & end up without gaining a thorough comprehension of the course material, & overdelivering content may overwhelm the learners

Diverse forms of media, such as video, audio, and games, can be utilized to deliver the content. Further, collaborative activities like video conferencing, forums and discussion groups will also make the delivery task more attractive and enhance teacher-student and student-student interactions.

Educational Institutes can adopt a commercially available Learning Management System (LMS), for instance, Moodle, Blackboard, and Canvas, or a tailor-made software solution that allows managing, delivering, and evaluating the student learning process effortlessly. Most of the commercially available LMSs typically require in-house or vendor infrastructure and are often limited to uploading course syllabi, and lecture material, receiving assignments, and conducting basic forums.

Web conferencing tools like Zoom and Adobe Connect facilitate to conduct lectures, tutorial discussions, and project-work discussions by improving collaborative learning. Further, they include advanced features such as polling, breakout rooms, whiteboard annotations, and screen sharing along with simultaneous video, voice, and text chat.

Digital textbooks offer a rich reading experience with some significant advantages over printed textbooks. Improved accessibility, flexibility, customization, and convenience of bookmarking are some of them.

Blogs are another tool that can be used for individual reflective writing. Wikis also play a significant role in blended learning concerning collaborative research and writing activities.

The use of breakthrough technologies such as simulations, games, augmented reality and virtual reality allows the students to observe and experience certain operations and tasks without actually performing them. The utilization of these tools and technologies realizes "Edutainment" or Education through entertainment which enhances the learning capacity of young tech-savvy learners.

Student Evaluation in Blended Learning

The Teaching-Learning Process (TLP) contains four components namely, assessing learning needs, planning, implementation, and evaluation. Hence, assessment is a vital component in TLP which links teaching with learning. In Hybrid learning, both online and offline assessment techniques can be incorporated.

The online evaluation environment allows frequent and a variety of assessments as opposed to traditional evaluation methodologies.[11] Thus, would be an effective and efficient mechanism for formative assessments especially.

Formative assessment techniques such as online discussions, blogs, online quizzes, computer-marked assignments, case studies and discussions, tutorials, presentations, and games can be conducted through online platforms. Conjointly, summative assessment mechanisms including online exams, virtual labs, simulations, projects, presentations, and portfolios can also be utilized.

Quizzes, short answer questions, games, and essays conducted online through a platform like LMS can be easily employed as pre-session and post-session homework or assignments.

Further, online evaluation renders multiple benefits including flexibility, catering divergence, and on-time feedback.

Assessing Blended Learning

The primary purpose of this assessment is to improve student engagement, availability of resources, and course quality[12]. According to published works, delivering, learning, resources, course outcomes and quality of assessments need to be evaluated.

The course outcome can be measured using grades and marks, activity, attendance, and dropouts. However, it is important to note that the measuring the attitudes of students towards learning, against the factors given above is unrealistic.

Self-report questionnaires can be used to measure student satisfaction with the blended learning approach. Through this technique, it

is possible to investigate various aspects including the overall course satisfaction, perceived teaching quality, and experience of the blended learning environment.

Identifying and understanding student engagement plays a vital role in the Higher Education sector due to its competitiveness. Three elements in student engagement, namely behavioral, emotional, and cognitive have been identified. Student engagement can be either positive or negative depending on how they have engaged in the learning process. Table 2 describes the instances of both positive and negative student involvements.

Table 2: Examples of Student's Behavioral, Emotional and Cognitive Involvement

	Positive engagement	Non-engagement	Negative engagement
Behavioral	Regularly attends lectures, actively takes part in lectures	Misses instructional sessions without excuse	Avoid or interrupt lectures
Emotional	Attention and involve	Bored and lack of interest	Refuse
Cognitive	fulfills or surpasses the criteria of the assignment	incomplete, rushed, or delayed assignments	Reformulate assignment attributes

Behavioral engagement can be examined through questionnaires and classroom observations. The ease of accessing the student activity and usage via blended learning programs evaluates behavioral engagement effortlessly. Questionnaires and interviews are used to measure emotional and cognitive engagement.

Conclusions

As a solution to the disrupted education system in Sri Lanka and to minimize the negative impacts of online learning, a blended learning approach can be practised. Further, adopting the hybrid learning approach can be the first step to being on par with developed educational systems in the world. Blended learning comes with advantages of both on-campus and digital educational modes and hence would improve the student learning experience. However, efficient use of web-based technologies and tools must be considered when converting some of the traditionally offline conducted parts of a course into digital platforms. In addition, the blended learning approaches need to be evaluated to ensure the primary goal of enhancing the student learning experience has been met.

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CHAPTER 4

Role of Educational Psychology in Creating a Conducive Teaching-learning Environment in the Classroom to Stimulate Learner's Achievements

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Introduction

"To the world, you may be just a teacher but to your students, you are a hero."

-Mark Twain Elementary School-

Every facet of a student's life, including attendance, academic achievement, and extracurricular activities, is impacted by student motivation. Especially in today's competitive educational environment, where schools are under constant pressure to raise student achievement, responsibility, and accountability, it is crucial for every teacher to encourage the highest level of student commitment to excel in their need to reach better heights in their life. A number of variables determine immediate achievement and test results, and they may even be guaranteed in a number of ways. Increased immediate achievement practices may actually have the opposite impact, lowering pupils' long-term engagement and desire to study. A student's motivation cannot always be deduced from their performance on achievement tests[1]. The process by which a teacher selects the instructional materials, develops and implements the teaching and learning strategy, and decides on learning objectives is called teaching. Learning must have a significant role in student achievement for teaching to be effective. In the higher education sector, students are supposed to be treated like adults and given the flexibility to make their inquiries and

pursue evidence-based learning. They also anticipate the teachers to be amusing and helpful and to employ innovative and original teaching strategies[2].

Due to their repeated failures in school, students with learning impairments are frequently unmotivated. Rewarding students is one way to try and boost their vital motivation, which is sometimes blamed for low student accomplishment. The education system is now considered to be in crisis mainly because it leaves many pupils behind. An important part of this monograph is that one aspect of the solution to improving educational results is assisting in regulating students learning through the use of efficient learning strategies[3].

Every student is important in school and worth in various learning forms. Some students may suffer just as much from an overemphasis on "creativity" in the classroom as they may from an overemphasis on memorizing. Hard, repeated work, or "slog," may be necessary during specific learning stages. Additionally, some students may actually adapt to rote learning more readily than they do to reasoning and understanding[4].

This article explores the significance of understanding the conducive teaching-learning environment and the Role of educational psychology in the classroom to stimulate learner's achievements.

Understanding the Role of Educational Psychology in Creating a Conducive Teaching-learning Environment in the Classroom to Stimulate Learner's Achievements

The likelihood that students will engage in their academic tasks with effort, meaning, and strategy decreases when they are scared, apprehensive, or stressed about making mistakes. To establish a friendly environment that promotes greater learning, educational psychology is required. After carefully reading the studies, it is clear that educational psychology plays a crucial role in creating a supportive learning environment that improves student retention and academic performance.

Educational psychology has made significant contributions to designing the teaching-learning environment. The following are the ways in which teacher benefits from it:

1. To Know Your Learner:

Within the teaching-learning preparation, the learner is at the center. Understanding a student's learning capacity, intrigued, states of mind, aptitudes, imagination, judgment skills, covert-overt behavior, inspiration, and other obtained or natural gifts and capacities is made conceivable by instructive brain research. Knowing the formative stages related with social, enthusiastic, mental, physical, mental, and stylish needs, as well as the degree of goal, cognizant and oblivious behavior,

person and bunch behavior, conflicts, and wants, is additionally useful for keeping up great mental cleanliness. On this premise, instruction can be given, and a teacher's state of mind toward the understudy can be moved forward.

2. To Deal with Diverse Learners:

The use of educational psychology by teachers enables them to modify their instruction to better meet the needs and skill levels of a diverse student body. The teacher must be knowledgeable of the many approaches, methods, concepts, laws, and other elements affecting teaching and learning in order for it to be effective. Only then, in the context of teaching and learning, can he or she employ diagnostic and corrective methods. This can result in a teaching-learning atmosphere that is conducive. Respectful surroundings are crucial for improving/fostering students' capacity for problem-solving and conceptual understanding.

3. To Obtain Knowledge of Individual Differences:

Nobody is exactly like another. The degree of intelligence, aptitudes, attitude, interest, and inventiveness that learners possess vary. There are gifted, underachievers, sluggish, backward, and learners with varying abilities. Therefore, educational psychology aids the instructor in understanding the unique characteristics of each student in the class and the methods, tactics, and approaches that may be used to help them deal with differences.

4. To Deal with Special Needs Learners:

They could be physically challenged or delinquent children (juvenile delinquent). The kids with special needs are the ones that require modified lesson plans, modified learning environments, or modified learning procedures. These kids are identified, which aids teachers in choosing pedagogy that is appropriate for them. Instructions that are specifically created to satisfy the distinct needs of students or youngsters with special needs are referred to as special education.

5. Socialization in Classroom:

A person learns to act in similarity with social norms and traditions through the method of socialization. Learning around and creating group elements, cooperation, and authority characteristics in understudies is assisted by educational psychology. High scholastic achievement may be a result of expanded inclusion and a climate that values each learner's endeavors and empowers and persuades them to take an interest[5].

Learning Techniques

Psychologists have evolved and evaluated the effectiveness of study and teaching techniques for over 100 years. More proficient Methods are underutilized, and numerous instructors are not learning about them. So numerous understudies still do not utilize them to prove and propose the strategies that might advantage the understudy execution with low overhead. Moreover, a few learning methods prevalent and regularly utilized by understudies are relatively ineffective.

1. Elaborative Interrogation

People are curious creatures inclined to search for reasons behind the conditions, behaviors, and events within the world. Luckily, a considerable body of inquiry about the informative questioning and learning-enhancing potential can be maximized. Research on elaborative addressing and self-explanation, in specific, has illustrated that empowering students to reply to "Why?" inquiries can advance learning.

2. VAK Teaching

The VAK learning model was received with special interest in schools, as the best way of lesson planning for a successful class. This ideally incorporate activities that facilitate all three learning styles to cater to the needs of all pupils, where it has been employed as a means of helping pupils to learn more effectively and with greater enjoyment.

According to the VAK model the teachers should follow the strategies such as: explaining a topic aloud to the class for auditory learners, practical activities for the kinesthetic learners and reading textbooks and writing notes to satisfy visual learners.

As every pupil learns by using all three styles not just their dominant one, providing for all three in your lessons will create a rich educational environment for your pupils.

3. Self-learning

Even the smartest and most driven students may find it difficult to learn independently. It is an additional key that will unlock the doors of information for everyone who is interested in learning, rather than replacing the usual instructional learning method. It is a contemporary method of learning that enables a person to educate oneself abilities and information that will be useful in his everyday activities. A self-learner must have a clear understanding of his objectives and goals. As you delve farther, you begin to explore new realms that could have been taboo in traditional learning methods, and this can open up more doors to actively

pursue your goals on your own with the required assurance to deal with life's unforeseen circumstances by whatever means.

4. Inquiry-based Learning

Learning through inquiry promotes critical thinking and problem-solving. The teacher asks questions, presents scenarios and creates challenges instead of lecturing in the classroom. Students then conduct individual or group research on these topics to arrive at their conclusions. Together with the other students, they can then present the results and supporting material to the class. After hearing what other students have discovered, students can broaden their answers further by highlighting areas that need more attention and details.

5. Blended Learning

As the name suggests, the method is a combination of traditional and conventional learning systems. Although the introduction of blended learning dates back decades, its validity was much admired during the COVID pandemic. The method allows the student and teacher to use the benefits of both traditional and conventional learning. Station rotation, flexible learning and virtual reality are some of the tools used in blended learning.

6. Jigsaws

Puzzles are any other choice for lively learning. Above all, the puzzles constitute the possibility for college students to educate different college students. Even though "we examine via way of means of teaching", the blanketed impact states that the fine manner to completely apprehend some thing is to give an explanation for it to a person else. Students are divided into organizations and given exclusive talent degrees in the usage of puzzles. The subsequent step is for every institution of college students to apprehend the fabric properly sufficient in an effort to by skipping it directly to a person else. Students are then divided into exclusive organizations in which they need to proportion their know-how with others. They will maintain this manner till every institution has the records to remedy the problem.

7. Peer Teaching

Students reveal mastery once they provide an explanation for or teach others, as we mentioned whilst speaking approximately jigsaw puzzles. Ask college students to choose a subject that hobbies them in the parameters of the direction they may be taking. Give them the risk to inspect the situation and bring a presentation on it independently. Allow

college students to provide all through magnificence which will tell their classmates approximately their selected situation. Students benefit from confidence, independence, and presentation talents via peer teaching[6].

8. Flipped Classroom

Flipped study room approach is the various extensively used and maximum famous contemporary-day coaching techniques. The coaching takes location in a flipped manner. The technique reverses the conventional coaching approach of referring content material at college and exercise at domestic to refer content material in domestic and exercise in college. The technique is ready for finishing domestic paintings at college and doing the research at domestic changing the college into the middle of realistic education. The approach permits the scholars to study the subjects intensive and studies via extraordinary perspectives. Doubts may be clarified in magnificence with the magnificence of friends and teachers. Further, it permits the scholars to paintings at their personal paces and the lecturer acquired the cap potential to offer one-one supervision. Also, the technique permits the scholars to investigate through a video tutorial, seek online, or paintings at the content material commonly shared with the aid of the lecturer. One of the most important advantages of the technique is students` illness will now no longer have an effect on his research as the bulk of the gaining knowledge of is carried out via self-exploration[7].

Conclusion

Educational psychology has contributed strikingly inside the presentation of the present-day machine of training. It has made a difference in teachers and executives to grow a fair-minded and equitable mindset toward inexperienced people and encourages them into included personalities. Educational psychology is highly centrally in tending to the fate wants of the instruction framework since the complexities are developing each day, therefore it's miles an effective way to oversee them. Its position is significant to recognize and deal approximately the troubles associated with inexperienced persons, including tiers of development, understand personal differences, become aware of kids with unique desires, tackle lecture room troubles, skills and hobby in teaching. Further powerful techniques of teaching, understand impact of heredity and surroundings at the child, aware intellectual fitness of the child helps the teacher to deliver the required service accurately. The process of curriculum making, guidance and counselling, assessment and evaluation, retain discipline, academic psychology and research, socialization in the lecture room and expert growth, convert mindset and take the modern way of thinking of teachers into account[5].

It is argued that the theories and empirical proof from psychology and academic studies may have an oblique impact on academic practice. They do now no longer offer answers to realistic problems instantaneously. But their oblique impact remains essential via alerting instructors and educationalists to new approaches to conceptualizing the gaining knowledge of the process. Some well-known implications may be derived from the study's findings; however, the more essential implications are much more likely to return from the teacher's own information of mental ideas[8].

Modern pedagogy strategies will allow the newcomers to successfully and enthusiastically retain the research collaboratively and cooperatively. Summarizing cutting-edge coaching technology is restructuring mastering to fulfill international standards. All cutting-edge teaching methods have benefits and drawbacks, so educators must thoroughly review them with students when they reach adulthood before settling on a particular approach or approaches. Finally, it's far essential for instructors to boom pupil engagement via energetic mastering, to guide inclusion amongst college students via the mastering process (experiential and mixed mastering), and to align effects with school and pupil expectancies via evaluations[9].

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CHAPTER 5

A New Generation of Learning and Teaching Management Methods

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Introduction

Active learning environments in the classroom are essential for preparing students for their future. Nearly a one third of students' lives are spent in schools, where they develop personalities that are extremely challenging to change and develop later in life. Their later integration into society will largely depend on their personal traits and skills, which plays a larger and significant role of a well-planned and well-accomplished education. Such an education endeavor includes a friendly environment of mutual understanding, collaborative inquiry learning, and experience in all subject areas.

How should the educational process be set up in a world that is changing quickly so that students can learn effectively throughout their lives? What are the psychological, educational, and social variables that affect effective learning? How should effective education be assessed? These questions form the foundation of a prosperous society in the future.

Fostering Communities of Learning, Learning by Design and Case-based Reasoning, Central Conceptual Structures Theory, Cognitive Tutors and ACT-R Theory, Direct Instruction , Higher Order Thinking Skills, and Knowledge Building are some of the methods highlighted in this chapter.

Fostering Communities of Learning

The constructivist teaching method known as Fostering Community of Learners (FCL) emphasizes democratic, student-centred, question-based teaching that aims to develop higher-level understanding using challenging real-world tasks, collaborative scientific research, and reciprocal teaching.

The FCL theory is based on the Vygotskian concept of the zone of proximal development. It also uses terms such as availability zone, teaching sensitivity zone, and skill bandwidth. In this context, the zone of proximal development is defined as the gap between what a learner can do or understand on their own and what they can accomplish with the help of an adult of the same age or more (Figure 1). In other words, it is the difference between what a young person can learn independently and what they can acquire with competent supervision.

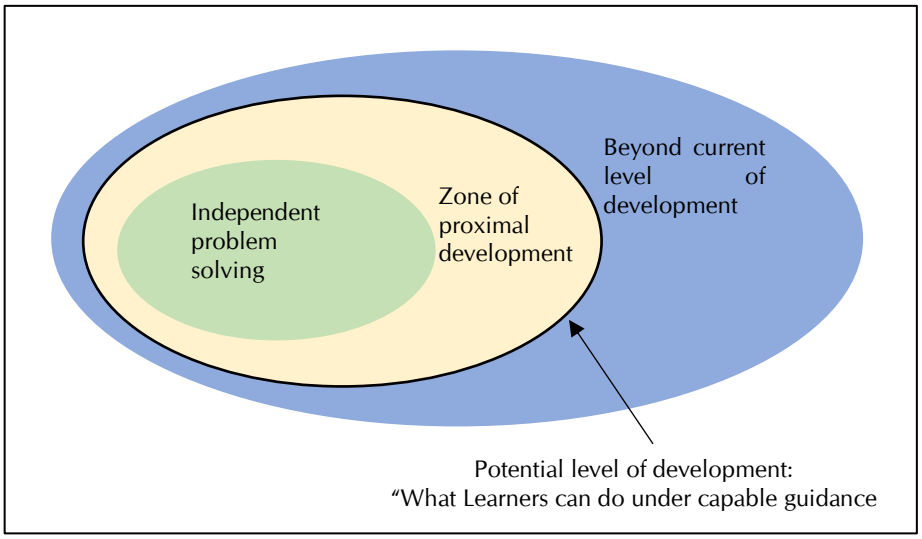

Figure 1: Zone of Proximal Development

FCL highlight that the role of the teacher is to guide and supervise students as they explore the boundaries of their zone of development. Facilitators must direct the student's learning while making discernment to determine when to intervene and when to let them solve problems on their own, and it is a difficult position.

However, for FCL to be evaluated in place, a number of successful classroom features must be present. The following are the fundamental features of FCL classrooms:

1. Individual Responsibility Coupled with Communal Sharing.
2. Multiple zones of proximal development.
3. Ritual, Familiar Participant Structures.
4. A Community of Discourse.
5. Seeding, Migration, and Appropriation of Ideas.

In a sense, FCL is a constructivist way of collaborating with students to help them understand key curricular concepts in the context of their own thinking and research.

Learning by Design and Case-based Reasoning

Learning by Design is an inquiry-based approach to learning that focuses on learning to change to new situations and it is derived from case-based reasoning theory (CBR)[1]. CBR theory was developed to implement a computer program that could solve problems based on previous experience. Computer models of the encoding, retrieval, and adaptive processes involved in analogical thinking also provide insight into human cognition, particularly the role of past experience in solving new problems, and have implications for the development of educational guidelines[2].

This relates to the types of problems that need to be solved in the classroom, strategies for dealing with complex problems, and the kind of self-reflection that needs to be encouraged.

The rationale for CBR is that reasoners naturally make use of personal experience when reasoning about unknown or uncertain information during problem-solving. In such situations, thinkers try to recall comparable past experiences in order to arrive at an interpretation of the current situation. Past experience can be used to predict and guide the impact of possible solutions and to warn of potential problems[3].

As per to CBR, past experiences are kept as cases. According to CBR, resolving a problem requires matching a new situation or problem with relevant previous encounters coded into the case. Various aspects of the situation description are used to probe memory for instances that match the probe during this matching process. The outcome of this correspondence search depends on three factors[4]: (a) the richness of epitome in mind (i.e., the extent to which the thinker interprets, articulates, and records the experience completely and accurately); (b) the richness of inquiry (i.e., how the thinker interprets a new situation completely and accurately to understand what is important about it); (c) How well do you compare new problems with previous?

Each of these properties of case-based reasoning has important educational implications. Learners must first have access to a substantial corpus of rich instances to increase their likelihood of identifying past experiences that can be applied to their current scenarios. Students must learn to describe the task at hand and be able to understand the relationship between current activity and previous knowledge in order to revisit and present the task from different angles.

However, while CBR suggests the types of experiences and discussions that students should have in order to learn deeply, it does not provide detailed guidelines on teaching methods[5].

Students begin the standard activity flow with a rocket design task that can connect to various objects and construction stuff. The teacher then leads the class into a conversation, allowing everyone to share their findings through the experiment and develop, evaluate and compare solutions to the problem. The group then decides what topics the students need to learn more about. Students work in small groups to research a specific problem and present their findings to their classmates. Then the lessons learned in the design project are applied again. After each build cycle, there are numerous presentations and talks focused on what we tried, what we learned, and how we applied what we learned. These briefings help students organize their thoughts, speak coherently, and encourage active listening so they can learn from other students' approaches to their projects. A lot of effort goes into these tasks to determine what else you need to learn and to examine and explain why some strategies didn't work as planned[6].

In a sense, Case-based reasoning models show how best to structure learning activities so that students can build on them in the future, and how students utilize previous knowledge for learning and problem-solving. Outline what the principle of case-based reasoning applies to learning-by-design projects.

Central Conceptual Structures

Growing up causes to changes in a child's thinking across a variety of cognitive domains, such as how they perceive narratives, numbers, and space. This process is described by the central conceptual structures (CCS). It is a Neo-Piagetian theory, which means that it incorporates aspects of the now-classic account of child cognitive development developed by Jean Piaget[7]. Like Piaget, Case believed that development occurred in stages and that children's thinking reflected the development of their intellectual abilities. According to CCS theory, the transition from one developmental stage to the next is constrained by the maturation of the biological brain and, more specifically, the brain structures associated with working memory that control mental processing speed. However, brain development is also greatly influenced by experience, which influences and stimulates cognitive evolution[8].

Piaget (as well as Case) made the assumption that People try to understand the world and change their way of thinking when they cannot adapt to new situations[9]. When the learner experiences something that the accepted mode of thinking cannot comprise for, this is referred to as disequilibrium. Discord encourages learners to modify their mental models. Examples of these cognitive shifts include the blending of various ideas, the separating of various facets of a single idea, and generally the progression to a more complex stage of development. Because they saw the learner as someone who is actively constructing and shaping his knowledge, these

Piagetian ideas have had a long-lasting impact on education. This learner role, in which students acquire knowledge through inquiry, active engagement, and social interaction, has served as a model for many constructivists educational practices. Giving students not only an active role but a voice has a profound impact on teaching practice. A few other implications are[10];

- A student's current level of knowledge should serve as a basis when introducing new concepts.
- Designing a series of step-by-step activities to allow students to progress from their current knowledge to the next higher level and to progressively more sophisticated understandings is a way of thinking at the level of thinking that follows the student's current understanding.
- Since imbalance drives students to new understandings, it is beneficial to induce cognitive conflict. For example, by pointing out deficiencies in the student's current thought patterns.

Most educators today agree with these assumptions, but they are expressed in such abstract terms that they are difficult to put into practice. CCS theory is easier to understand than the original Piaget theory in this regard, as it makes predictions about the nature of changes in cognitive structure in specific areas of content, such as numbers, space, and narrative.

In short, CCS strongly recommends that instructional design focus on knowledge that is essential to professional competence and use models that show how learners construct knowledge throughout development. Consider the possibility that some children build on the precursor forms of understanding exhibited at an early age because they do not have the day-to-day experience necessary to develop important core conceptual structures.

Cognitive Tutors and ACT-R Theory

Individual tutoring is frequently more efficient than classroom instruction as a whole. However, it is only seldom able to give each child individualized education due to financial constraints. Computers do, however, offer the option of one-on-one electronic coaching due to modern computer systems' adaptability and ability to anticipate user demands. By providing individualized feedback, on-task prompts, or corrections and changing the difficulty of activities to the user's skill level, smart software uses this adaptability to support learners. Learning has been enhanced by the use of such advanced computer tutoring systems, especially while studying science, technology, and math[11].

One illustration of a research-based strategy for the use of electronic tutors is the phrase "Cognitive Tutors," which is used to describe a number

of applications that concentrate on subjects like algebra, geometry, or computer programming. Through the use of a cognitive model of the competence that students acquire, these programs aim to develop education. The ACT-R theory (Adaptive Control of Thought-Rational), a theory of performance and learning that explains how the brain functions to explain human cognition, is the foundation for these models[11].

The Cognitive Tutor program continuously monitors student behavior and determines the likelihood that it is influenced by particular target production rules. The software tries to determine the student's intents during this procedure by comparing the observed student behavior to cognitive action paths from its library. due to the model-tracing process, which involves comparing the student's behavior to cognitive models. In the event that a match is found, the tutoring system can provide real-time, individualized training based on the student's place in the problem. The tutor doesn't comment when a pupil gives accurate answers and lets them continue. If the pupil is encountering difficulties, a tip can be provided. When a learner makes a mistake, the application provides feedback to help them get back on the correct track for finding the solution[13].

In a sense, cognitive tutors are intelligent computer programs that support students' learning by structuring it, providing feedback, and providing aid as required. The models of typical learning pathways and typical misunderstandings, which define the acquisition of succeeding sub-goals and production-rules, are the foundation of the educational programs. By comparing student performance to typical learning paths, responses may be evaluated and corrected with relevant feedback.

Direct Instruction

With the use of the teacher's direct instructions, clear communication and a high rate of student success through extended guided, sequenced practice, the teaching technique known as "Direct Instruction"[14]. Aims to improve and accelerate learning. Despite multiple studies showing that it can improve a number of learning outcomes, including reading and mathematics, the technique is contentious and generally regarded with apathy due to its prescriptive character and the major role performed by the teacher. The primary ideas of Direct Instruction are[15];

- All students have the information processing ability to process information and to extrapolate features from examples.
- Students make logical generalizations based on the similarities of features among various examples.
- What students discover is in line with the instruction they receive.
- As students gain experience, their memory and feature-abstraction abilities develop.

These premises led to the conclusion that information needed to be delivered in a clear and consistent manner for pupils to learn a concept. At the same time, if learning doesn't take place as expected, it's probably because the practice and instruction were not sufficiently clear. As a result, the goal of Direct Instruction teaching is to guarantee clear communication and the best example selection throughout instruction.

Formats for Direct Instruction give teachers detailed instructions on how to deliver examples, as well as the appropriate questions, answers, and corrections. These styles are intended to assist professors in being succinct and clear while assisting students in focusing on the key components of the lesson[15]. For example, there are rules for the selection of examples (how to clearly show the differences between examples and non-examples), the wording of explanations (teachers should use the same wording across the board because variations may cause to the confusion), and error corrections (teachers should model the right answer, test if the scholar can repeat it, provide additional practice, and retest the first item after a delay).

In the beginning, teaching with direct instruction is very structured and supportive to ensure a high level of student success while learning. Teachers concentrate students' attention on key elements of the topic by modelling new skills, providing very detailed instruction, and employing prompts in sanitized circumstances. Then, formats gradually alter to let students put their skills to use independently and in situations that are more difficult. For instance, pupils progressively learn to complete problem-solving processes "in their heads" after initially expressing them out loud. In order to maintain skill retention, enormous amounts of practice are eventually replaced by distributed practice over longer time spans, and feedback is increasingly delayed to create more realistic circumstances[16].

During teacher-student interactions in Direct Instruction, it is planned to allow students as much time as possible to interact with the syllabus and receive the feedback they require. The argument for this is that when students can respond more actively, learning may take place more effectively and they are less likely to get distracted or engage in disruptive conduct. Additionally, teachers may more accurately evaluate their pupils' performance while they are engaged in active practice. One method that is usually used to accomplish is a symphonic reaction with a signal system. In essence, this uses a cueing approach where the teacher poses a question, permits the class to ponder, and then prompts everyone to respond at once ("on signal").

Briefly stated, Direct Instruction relies on formally defined and scripted teaching techniques that were developed to promote transparent and clear messages and to actively engage every student in practice with a high success and low error rate.

Higher Order Thinking Skills

A compensatory program called Higher Order Thinking Skills (HOTS) teaches children who are struggling academically how to think broadly through dialogic talks. Daily pullout classes contain rigorous discussions between small groups of students and a qualified teacher centred around complex riddles given on the internet. The methodology is based on the concept that students who lack practice in sophisticated thinking and a "knowledge of understanding" will eventually lag behind when the demands for thinking associated with content learning increase. The purpose of HOTS is to help these kids develop the capacity for sophisticated thought so they can follow conventional classes more readily. One of the fundamental tenets of HOTS is that the majority of students don't lag behind because they are not clever at all; rather, that's because they have little or no social-cultural experiences that foster the development of recursive skills, such as engaging in argumentative discussions with their family members, which are crucial for the development of complex reasoning skills[17].

As a result, the importance of compensatory teaching activities is to give students more than enough practice with complex thinking, encourage them to express their thought processes, and show them how strategic thinking results in effective problem-solving.

The foundation of HOTS is the idea that disadvantaged students' biggest issue is their inability to develop the kinds of understanding required to handle challenging academic concepts. For example, they are unable to handle multiple concepts at once, deal with ambiguity, or engage in an intellectual conversation. These kinds of general problem-solving abilities are what the HOTS program aims to help students develop so they can comprehend what they are taught in regular classes more fully. Intellectually challenging concepts are covered in HOTS classes so that students will learn to persevere and gain the satisfaction of achieving a goal after putting forward the same effort to do so. In order to provide the students' practice with critical cognitive thinking skills including ambiguity resolution, meaning building, and complicated idea and method expression, the instructor actively promotes debate during the classes[18].

The fundamental component of the HOTS method is the communication between professors and students, even when software is employed to motivate pupils. However, the bulk of learning during HOTS courses comes out from understanding, perspective, and articulation exercises conducted between teacher-student conversations, not from using the program. The software allows students to immediately test their ideas prior to expressing them. Teachers encourage students to communicate their ideas properly, discuss their research and approaches, and demonstrate why the machine is reacting a certain way to its strategies throughout the HOTS sessions. Teachers frequently encourage their pupils to consider their

strategies and forecast what will occur when they choose a given choice in order to increase their linguistic ability in terms of understanding and articulation[18].

In brief, HOTS is a compensatory program that gives students extensive practice using and verbalizing important general thinking abilities like metacognition and inference-making. Students participate in Dialogical discussions about concepts and approaches to solving problems.

Knowledge Building

Knowledge Building is a construct teaching-learning management approach that tries to restructure education around the goals and processes of knowledge development. On the basis of the idea that, despite differences in achievements, the process of acquiring knowledge is the same for adults and children, it involves students from all ages in the whole process of knowledge acquisition, including aims to deal with responsibility for knowledge advancement.

The key conceptual difference between Knowledge Building and other constructivist teaching methods in learning communities is the emphasis it places on ideas as subjects of investigation and enhancement in their own terms. Knowledge building aims to help students transition from being learners and inquirers to being active participants in a society that is constructing knowledge. Locating and extending the boundaries of understanding as well as creating concepts that benefit the learning community, are the key focuses of activities. The main objective of classwork is for learners to pose questions and collaborate to find solutions to knowledge challenges. All of their studying, writing, testing, and talking activities are related to this objective, which leads to the addition to or change of public information. The simultaneous occurrence of learning is viewed as "an internal, non-observable process that ends in improvements of thought, attitude, or competence".

Classrooms focused on organizing knowledge frequently use specialized learning environments. Using this discussion medium, participants add, modify, and move interlinked concepts that are expressed in short textual annotations and diagrams of networks of ideas or opinions. Examining the precise relationships between ideas as well as developing a broader perspective that incorporates ideas into more comprehensive conceptual frameworks are both stressed. These viewpoints demonstrate how ideas overlap, clash, or are constrained by one another. These higher-level conceptual structures may be independently developed by students as they make an effort to gain a better understanding of collections of ideas, or they may deviate from course goals that the students must work with, like an overview of the curriculum guide to which the students connect pertinent notes. Users of the software can create conceptual frameworks that are

already ordered, reformulating problems at greater levels of difficulty and resulting in more inclusive opinions. In order to build a "rise-above" perspective during this process, individuals are invited to annotate, cite, elaborate on, or connect to the views of other participants. Independent verification and collaborative editing processes, which enable correction and evaluation at any time, involve all participants.

Briefly said, knowledge building restructures instruction around goals and processes to create and improve common community knowledge. The software environment Knowledge Forum is one tool for this, allowing users to display, organize, change, arrange, and connect concepts in text or graphical form to build conceptual frameworks that get more and more complicated.

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Section 02

Promoting Student Engagement in the Teaching & Learning Process

CHAPTER 6

Ways to Motivate Students in Online Learning to Enhance their Achievements in Higher Education

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Background

The current turbulent environment caused by scenarios such as the Covid-19 pandemic has enforced online teaching and learning regulation in the education sector. In this situation, higher education is also turning away from traditional classroom environments to online or distance learning platforms. This approach implies that, at least in the near future, a significant proportion of higher education institutes will proceed with online teaching and learning. However, this sudden conversion caused both opportunities and obstacles for scholars in numerous ways. It is reported that most teachers and learners have seized the opportunities of these novel remote digital platforms with greater interest. On the other hand, it is reported that learners confronted various difficulties, such as health and socio-economics problems, due to this novel online teaching and learning methods. These challenges have negatively influenced the students' academic motivation and ultimately caused deprived performances of learners in higher education. Therefore, it is important to maintain motivation in learners in online learning to enhance their achievements in higher education.

Online Learning in Higher Education

Currently, the higher education sector is constantly undergoing various novel modifications, with universities obligated to keep up with

students' requirements and desires. As a result, technological advancements and online learning mechanisms are viewed as critical elements in the higher education system to facilitate both teaching-learning processes. The term "online learning" can be defined as a distance or remote education method that happens through the Internet using advanced technical tools when learners are geographically distant from the educator and their education institute[1]. Online learning provides teachers with an efficacious way to deliver lessons to learners by implementing a variety of technological tools instead of conventional teaching curriculums. Learning Management Systems (LMS), technical tools such as video conferencing software (Zoom, Microsoft Teams, and Google Meet) and other communication tools like email and chat messages are frequently used in online learning. With its variety of options and technological tools, the online teaching system can be personalized in a wide range of ways. It is the most effective method for creating an ideal learning environment tailored to the needs of each learner. The benefit of remote education is that it eliminates the need for learners and teachers to be present in the same geographical location. Access to a computer with internet access is the prerequisite for enrolling in an online learning method. At present, learners are able to use these online technologies in a variety of formats, including blended or hybrid formats and entirely virtual format[2].

A further benefit of online learning is that it has relatively low expenses, as it eliminates student transportation expenses and allows them to access learning materials at an additional cost. To obtain the maximum advantages of online teaching, it should be reachable for all learners at all times from any place without any barriers.

Effect of Online Learning on Learners' Physical and Psychological Health

Online learning, like most educational methods, has both benefits and drawbacks. Many learners claim that learning online had negatively affected their physical and mental health. One of the major complaints and drawbacks of online learning is the increased and lengthy in screen time. Due to spending all that time crouched over a screen, learners may experience eye problems, wrong posture and other physical health issues. They experience symptoms of severe mental health conditions by adapting to online learning. Online classes do not usually involve face-to-face interactions between learner and teachers as well as their peers. Therefore, online learning causes social isolation, and it increases the anxiety and stress of the learner.

Moreover, it has been reported that online learning methods also contribute to technology addiction and a lack of motivation. And furthermore, the different capacity of online learners to prepare their own study activities and schedules can occasionally result in significantly lower

motivation for learning. These physical and mental health complications result in the reduction of the energy level of the learner, a decrease in the concentration for the lesson, learner fidelity, and a decline in mental capacity and learner's confidence. To overcome these mental conflicts requires precise, everlasting influence and motivation for learners. In this scenario, parents and teachers have a variety of obligations to motivate and influence learners to boost their performances in online classes.

Definition and Types of Motivation

All people have a genuine innate desire to learn and develop from the moment they are born. In order to attain a goal, a person needs to be motivated, which is a state of mind characterized by vigor and passion[3]. The Latin word *movere*, which means "to move," is where the word motivation comes from[4]. Motivation is the process of inspiring others to take action and accomplish an intended purpose. The most important motivational theory among the various ones is Maslow's Hierarchy of Needs. Maslow's theory states that human needs can be divided into five categories: (a) physiologic, (b) safety, (c) social (sense of belonging), (d) esteem, and (e) self-realization. People are typically motivated by a diverse range of factors, making motivation a multilevel conceptual model, and it comes from extrinsic motivation and intrinsic motivation. Extrinsic and intrinsic motivation both play a role in keeping people moving forward; however, it is thought that intrinsic motivation predominates. Intrinsic motivation refers own self or behaviors that are driven within an individual by internal rewards or satisfaction.

In academia, variables of intrinsic motivation include the values of the learning activity and feelings of subject matter competency. The cognitive perspective is concerned with learner's motivation for competence, internal drive for success, attributions, and convictions that they have an effective influence over their surroundings. Contradictory to intrinsic motivation, extrinsic motivation refers to own self or behaviors that are driven within an individual by external rewards from own surroundings. Extrinsic motivational methods include the role teachers and peers play, classroom interaction dynamics, learning setting, and associated attitudes. According to research, extrinsic and intrinsic motivation can coexist, but attention to extrinsic drive can undermine intrinsic motivation. Figure 1 provides a graphic representation of the classification of human motivation[5].

Why Motivation is Crucial for Learner Engagement in Online Learning in Higher Education

Motivation is crucial to the learning process, whether it is face-to-face or online. However, it is critical in online learning since they cannot

just physically interact with other students. Both extrinsic and intrinsic motivations have diverse impacts on the learners. Interacting with their teacher and fellow peers enables learners to develop their own motivation[6]. Rather than being influenced by external motivating factors, these learners are often motivated internally. Successful online learners have steady personality attributes that have been recognized as internal determinants. However, if learners do not have such internal motivation, it could make them feel lonely, fail towards using technology, have difficulties in time management, and have failures in online learning. Therefore, the leading cause of why online learners underperform is the lack of both intrinsic and extrinsic motivation. In this scenario, motivation is incredibly important for online learners and must be taken into account when conducting online learning platforms.

Reasons for Lack of Motivation in Online Learning in the Higher Education System

Several reasons can be identified which cause a lack of motivation among learners in higher education. The difficulty of satisfying different learning styles of learners in computer-mediated learning can be considered as one of the learners' personal factors.

Specifically, kinesthetic learners will decrease learner motivation as there is a lack of interaction between the teacher and the learner.

Studies have found that learners who show a lack of motivation, fear, apprehension and worry are those who enroll in and experience their first online learning. Also, it is revealed that inadequacy in learner control in online teaching and learning setting reduces student motivation. Some students prefer social presence and face-to-face interactions to enhance their involvement in the learning process. Those students find the lessons unattractive in online platforms where there is a human-computer interaction, which will eventually decrease their enthusiasm for learning. Further, many learners might get distracted during the lesson because of other attractive websites such as social media (i.e.; Facebook, Instagram, WhatsApp, YouTube etc.). That will reduce their interest and motivation to engage in the lessons. Hence, it is essential to modify the websites and other interfaces to be more appealing, interactive and attractive to catch the student's attention and enhance motivation throughout the lesson. According to research, over half of the students failed to complete several online courses. Lack of an appropriate learning environment is to account for over half of the students who drop out of many online courses. Because they are at home while engaging in an online course, learners are more likely to get distracted. Higher education learners are usually adult learners, and often they may require additional training on how to use the required technologies.

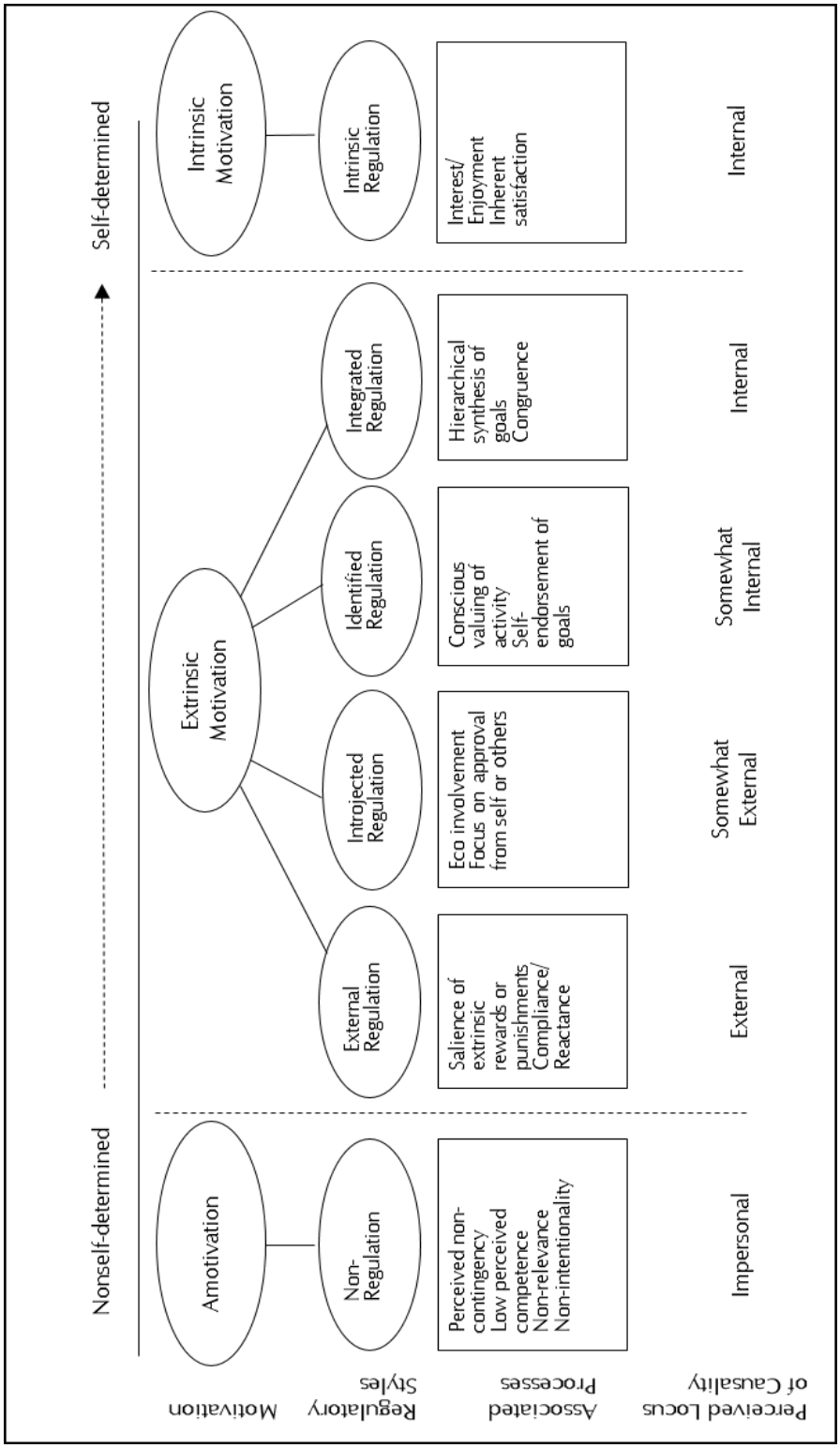

Figure 1: The Classification of Human Motivation

Motivational Strategies in Online Learning

Different learning environments provide learners with diverse learning strategies in which they can make learning interactions. By manipulating, or sustaining motivation for active engagement, motivational strategies, which are classified as effective learning strategies, influence learners' desire or desire to attain their learning goals[7]. These are several motivational strategies have identified in the higher education system[8].

- Creating a personal connection with learners. A teacher should have a strong positive relationship with learners in addition to an academic association.
- Develop a comfortable and congenial environment in the classroom.
- Cohesiveness - Interaction, cooperation, and the ability to share honest private details among learners contribute to forming a collaborative learning vicinity.
- Create course content that is interesting and relevant to students.
- Making the learning tasks more enjoyable. Teachers can make teaching more interactive and satisfying for the learner.
- Implement goal-setting strategies in the classroom.
- Eliminate or minimize the anxiety-inducing environment. The teacher should always prevent competition with both clever and weak students and label students as "weaker" or "better" than others; instead, interaction and collaboration with both strong and weak students must be encouraged.
- Use rewards and grades for student engagement[9].

These specific sub-strategies are classified as concrete cognitive and behavioral, intellectual, or conceptual approaches.

- Behavioral strategies include things like organizing the learning environments, guarding against distractions, and setting deadlines or reward systems for work completion[10].
- Mental or abstract motivation strategies, on the other hand, refer to the cognitive processes that are stimulated to increase interest in a task, which may include endeavors to make an activity more appropriate, interesting, or feasible[11].

Students can enhance their online learning interaction, concentrate on meeting their learning objectives, and use strategies to fend off online distractions when they can control their volition strategies. Table 1 shows the suggestions for developing motivational strategies in online learning according to a recently conducted study[11].

Table 2: Suggestions for Developing Motivational Strategies in Online Learning

Strategy	Suggestions
Goal Commitment Strategies	Set time for studying. Create a study schedule before beginning to study. Implement the study plan that the learner has developed. Set challenging goals before starting to study. Make sure to stick to the planned study schedule.
Mental Volition Strategies	Remind them to stick to their own study plan. Think about finding precautions against online distractors. High self-control not to get distracted Consider strategies for focusing on your own priorities. Keep a promise to own selves not to finish your studies before achieving the targets. Promise to put the phone away while studying.
Behavioral Volition Strategies	Avoiding exploring other websites on the Internet. Not to respond to the messages and keep learning. Not to gain notifications (e.g. Instagram, Facebook, WhatsApp). Avoid watching videos (e.g. YouTube). Avoid receiving calls while learning. Not to check the emails. Not to check the social media accounts.

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CHAPTER 7

Advanced Technologies to Promote Student Engagement and Quality of Student Achievements

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Introduction

The recent COVID-19 pandemic undoubtedly crippled typical human habits and stimulated the adoption of new behaviour, now defined as the new normal. Although most of the hard-hit societal pillars, *i.e.,* transportation, food, communication, shopping and leisure activities, were able to reach an equilibrium recently, certain debates still quiver around a primary pillar of life: education. Distressingly, conventional educators were significantly challenged to propose a sustainable action plan to gear up and expedite teaching-learning methods to transfer knowledge to students effectively. Although the situation demanded novel manoeuvres, the means to ascertain an appreciable reach remains questionable[1]. The education sector has also been revolutionised with the integration of its own new normal and garnered compelling attention. Initial endeavours to accomplish this include, teaching through Google Meets, Zoom, Skype and WhatsApp sessions. Although it addressed the pressing concern of content delivery, the continuation of the same techniques has plagued the students' involvement, thereby hampering effective learning. Importantly, we should also recognise that the premise of an ideal teaching-learning approach does not exist universally, and the students' adaptation to such approaches may be contingent on numerous reasons, such as (not exclusively limited to) locality, accessibility to technology and financial concerns. Therefore, the concept of

new-normal is evidently experimental and presents great scope for improvement according to the telling statistics reported in the literature. Thus, this brief book chapter outlines the use of artificial intelligence (AI) as a tool to enhance teaching and learning activities and thereby promote student-centred learning.

Is Artificial Intelligence a Tool for Education?

AI is indeed a popular topic among many owing to its diverse applications in every discipline. Digitalisation is a prerequisite to applying seamless integration of AI and is presently rather ubiquitous due to the easy access to smartphones and their other variants 2. Extensive research in computer networking is constantly pushing the boundaries of connectivity, thus enabling the capabilities of AI to be rolled out for interesting content creation (see Figure 1). Although the development of AI has been in place for decades, the adoption of these technologies has been rather slow, primarily due to their inherent complexity in the past. It is acknowledged that developed countries have employed such technologies to manage most of the day-to-day processes, whereas developing countries are also displaying an uprise in relevant expertise.

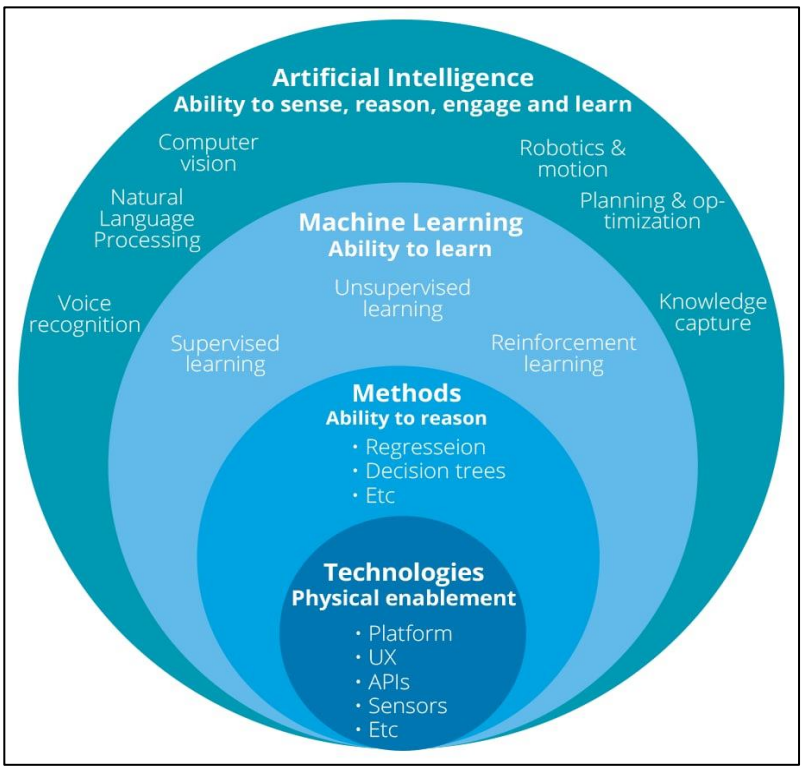

Figure 1: The Breakdown of the Artificial Intelligence (AI) Scope

Source: Salim's Blog[3]

AI is generally a broad assortment of technologies (as indicated in Figure 1), where the most noteworthy are Augmented/Virtual Reality (AR/VR) and Machine Learning (ML). The others have portrayed a slow pace in reaching the education sectors compared to the above-mentioned, however the potential in indeed limitless, merely due to the rapid development of the field. Once proper focus is gathered, AI can one day replace the role of a teacher, which can be considered a slight risk at this point.

Augmented/ Virtual Reality (ML)

The use of AR/VR is particularly interesting for education to incorporate visual aids to teaching as it transforms the 2-D space into 3-D. A detailed explanation of AR/VR is beyond the scope of this work, and the interested readers are referred elsewhere[4]. Despite its great promise in delivering elegant opportunities, content creation is indeed troublesome; thus, the availability might be discipline-dependent[5]. As such, AR/VR content might be readily available for engineering and mathematics subjects contrary to the other domains. As an example, in engineering, employees/students have been briefed about industrial safety practices through AR/VR video materials, which not only promote learning but also allow the employees/students to be educated about the entire workflow of the plant and virtually reach areas that are otherwise considered dangerous. In mathematics, AR/VR is employed to show how mathematical functions and geometries behave in 3-D space. This is beneficial for student-centred teaching and learning to foster activity-based understanding in contrast to theory-based. Furthermore, complex topics such as vector calculus and topology can be easily delivered with the help of AR/VR visual aids. Although such tools are no secrets to university education, primary and secondary education are still in their infancy in terms of implementation. AR/VR contents are still not abundantly available for the above segments, thus presenting a window of opportunity to concentrate on targeted content creation. Notably, if primary education tools are developed via AR/VR, they can readily stimulate children's minds and make teaching and learning convenient.

The AR/VR approach does not require exclusive equipment but can be facilitated through makeshift devices. The most expensive possession for AR/VR is a mobile phone, and the perfect example would be the Google Cardboard (Figure 2). Hence the approach has significant merits for the education sector with the most alarming challenge pertaining to content creation. Such content requires to be strategic in order to aim at cognitive skills, specifically for primary education. Games ascribed to language, mathematics, science and technology-based games are noteworthy. Readers are referred to published materials for more information.

a)

b)

Figure 2: a) The Google Cardboard and b) Potential Educational Games for an Immersive Experience
Source: Google[6]

Machine Learning (ML)

ML has been a growing area of interest and has been involved in developing many interesting educational contents[7]. ML-inspired learning is driven based on data and is an integral component in Education 4.0, which is derived from AI[8]. University educators quite popularly adopt these to distinguish students requiring special attention. This is particularly beneficial to identify potential course dropouts and take necessary measures to avoid such unfortunate situations. Moreover, recommendations for new classrooms, curriculum amendments and learning speed management for students are leveraged by ML[9]. This enables tailored content delivery for student-centred learning. ML topics may display severe amounts of intricacy for a layman. However, the theory behind is now rather easily embraced regardless of the age or the education level of a student, which enables ML tools to be developed by almost anyone. Computer or mobile games are another popular component of ML which are invariably beneficial for primary school level teaching. Object recognition games for kids are in the forefront of ML-based games. At the university level, teaching and learning ML-tools are essentially adopted to perform complex computations and observe very complex behaviours of systems which otherwise require extensive solving using pen and paper. Evidently, engineering disciplines benefit immensely from such tools to study transient dynamics. Furthermore,

when the knowledge of advanced statistics is required, especially when a multitude of influential factors are involved in studying a single or multiple target response, the knowledge of ML can be extremely beneficial. Therefore, the knowledge in ML can easily be transformed to elevate the student's achievements without a doubt.

Most importantly, ML has become a norm for any type of research to deviate from conventional theory development[10]. Such approaches are primarily data-driven and with limited knowledge, any student may attempt to find solutions for complex research or industry problems (Figure 3). Generally, research problems are difficult to be tackled individually and require teamwork. Especially, ML-related work may demand a team of individuals be encompassed from different disciplines working towards a common goal. This is outlined as one of the main processes of learning through practice and collaboration. It promotes learning and allows students to understand the dynamics of a team, the ethics of working together and, most importantly, how to respect each other. The exposure and experiences shared throughout such projects may help students and inspire them further to achieve more and set high standards for future aspirations.

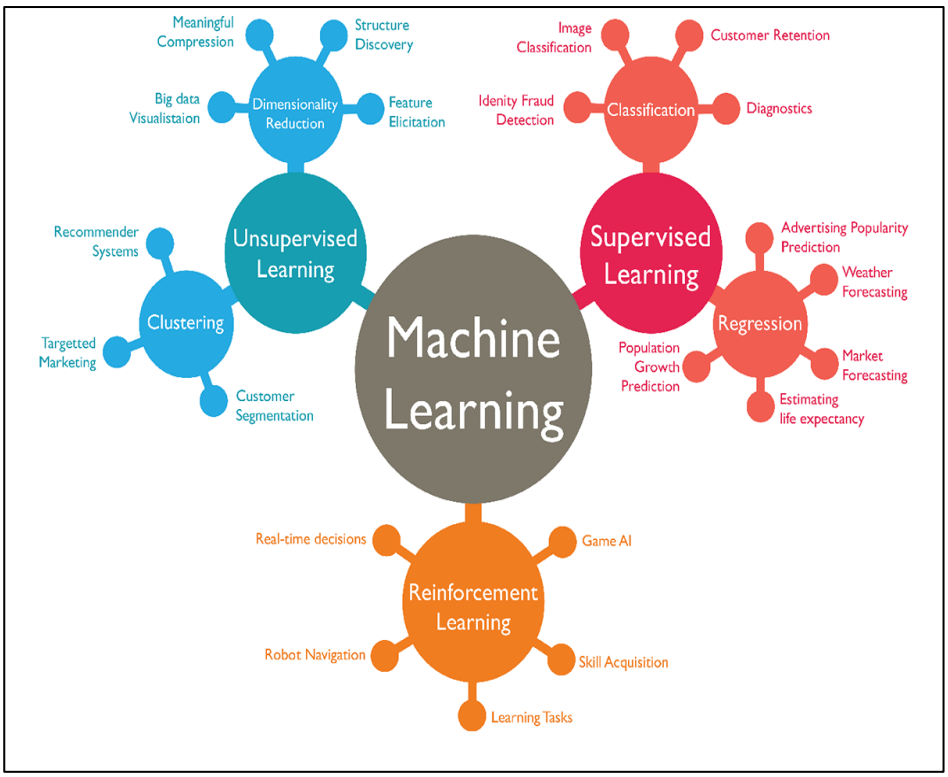

Figure 3: Potential Areas of Machine Learning (ML)
Source: Olga Pekisheva[11]

Moreover, online platforms (e.g., Kaggle) are available with crowd-provided datasets, which invite any individual to improve or learn the skillset in ML. The solutions are often presented in computer programming languages, and they are open-source, which further permits peer-learning[12]. Timely competitions are conducted by these platforms, which often promote teamwork or seldom individual work. Irrespective of the nature of the competitions, it should be noted that student-centred learning is encouraged in every aspect of a competition.

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CHAPTER 8

Innovative Online Teaching Strategies Enabling Active Participation and Communal Building

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The COVID-19 pandemic made a global impact on the education sector severely, Sri Lankan higher education being no exception. Despite the pandemic the economic crisis has become a huge blow to the higher education sector. The turbulent environment since 2020 has forced the higher education sector to rethink and redesign its key processes. Accordingly, a significant transition was made from physical education to online education in Sri Lanka, higher education being more remarkable. The sudden transition from conventional face-to-face teaching to remote means itself created a challenging background for both the parties, the educators, and the learners. Uninterrupted digital service provision, prompt adaptation to digital devices, provision of practical knowledge through virtual means and evaluation of the learners emerged as the severe challenges at the initial stage of the transition. But the higher education sector has successfully adapted to the situation within a couple of years. Further, the current socio-economic condition has left out no option other than the online means to sustain the continuation of the processes, higher education being one of them. The effectiveness of the teaching and learning process has become the most significant challenge to be addressed in the new normal.

This article explores the organizational aspect of teaching-facilitating a dynamic robust online course that needs to be adopted by a reflective educator.

The Facilitator's Responsibility

Facilitating online education in the current context requires an educator to be innovative and creative to ensure an impactful online presence. In the contemporary online teaching and learning environment, retaining students thoughtfully engaged and motivated while dispensing the intended course content demands faculty enabling a safe, nonjudgmental environment from which perspectives, professional and personal learning experiences are encouraged. The educator must exhibit an active, student-centered learning process by which students are detained accountable for their active participation and self-directed learning process. Also, they are supposed to seek the facilitator's support to ensure an enhanced learning experience. Educators who are meant to be the facilitators of the online education process are obliged to adopt strategies that boost students' active participation and entrust communal building. This encourages developing relationships among peers, collaborative learning, and nurtures educator feedback. More importantly, it inspires strong networking and self-directed proactive learning. In addition, educators need to enhance and encourage complex-reasoning skills through appropriate strategies while assisting students in developing a sense of reflective self and a personal and professional ethos that eventually translates into increased confidence[2].

In the case of all the educational disciplines, the students are expected to translate the work-related environments. Thus, learning should be transformational and should facilitate students with more chances to explore and reflect upon their assumptions, to critically analyze their judgements, and to integrate novel thinking patterns into their personhood. Sharing ideas and professional values are the basements of creating new knowledge becoming translational in practice.

The Outcome of Developing an Online Course

The major challenge faced by educators in the online education system is in the designing stage of the course. Scheming an online course which is equipped with varieties of active learning activities that can be remotely conducted effectively, enhancing student engagement, and creating a flexible platform for developing skill set, dissemination of knowledge and sharing ideas is the hardest part of all. The ultimate outcome of an e-learning course is to facilitate students with prospects to glean the essence of their educational scope and the capability to productively translate knowledge into practice at the end of the day. In terms of achieving the expected outcome, it is essential to implement a learning process that inspires a positive experience for both parties, the educators, and the students[1].

Tips for Effective Online Course Design

The outcomes of research conducted on remote learning propose modifications that should be adopted in delivering a successful online course to entrust the students with the expected learning experience. Even though the same learning outcomes are expected at the end of the respective course, whether it is delivered in the online learning environment or the physical in-class environment, redesigning the syllabus is essential in the transition of teaching and learning environment to online means. Unlike the course delivered in class, the remote course requires to be more detailed, well-instructed, and structured, so that the student is able to absorb the content effectively. It is required to provide proper guidance through extensive material posted on the learning platform, proposing various learning activities, etc.

Maintaining a strict policy regarding the deadlines for assignment submissions in online learning platforms has exhibited good results in terms of students' learning curves. Imposing clear and realistic deadlines, considering submissions after the due date and time as late submissions, and introducing a penalty is an effective practice to keep the student on track effortlessly.

Expecting unprecedented situations, adapting to them within a very short term are some other practices expected from both educators and students who are obligated to complete an online course. Lack of resources, problems with internet services, and technical issues might introduce unexpected disruption to the smooth flow of the course. In the event of such a situation, the educator shall maintain a flexible policy to secure interest and enthusiasm in the learning environment. However, maintaining well-defined criteria is key to achieving massive success in the scenarios.

Managing the Online Community

Designing an online community is a crucial strategy recommended in many research works on online education. Based on the learning platform adopted at the respective university, the online community can be formulated, which fosters successful student learning. The aforementioned target can be achieved by integrating the learning platforms such as Blackboard, Moodle Google Classroom, etc. Similar functions are provided by any platform. Even though this is practiced in almost all the higher education institutes in Sri Lanka, some other features to enhance the effectiveness of the delivery are proposed as follows.

It is a conventional practice to disseminate the whole content of a semester via an online learning platform. But an extra consideration in structuring the course must be paid so that the course promotes critical thinking, reflection, and active participation. Moreover, the educator must ensure that it thoughtfully engages in collaborative learning.

Enhancing Collaborative Learning in the Online Learning Platform

Extremely positive steps for enhancing online collaborative learning include allocating virtual office hours, setting the 24- to 48-hour rule of providing a response to emails for students and other relevant parties, and offering as much clarity and transparency of course requirements and criteria for success. Regular communication is another strategy that boosts collaborative learning. Adopting Google group emails and regular announcements in the online learning platform offers considerable support to guide the students along the correct track to meet the expectations of the course and fulfill the necessary criteria[2].

Effective Structuring of Groups

Managing a large number in the online community is challenging in terms of achieving the goals of collaborative peer learning. Group dynamics play a major role in student inter-relationships. Here, deciding the number of students per group is an important point of consideration. According to the research outcomes, five to seven students per group lead to have an effective, engaged dialogue. A higher number of students per group has a tendency to lead to an overwhelming experience. In contrast, a fewer number of students do not promote a strong discussion that meets the intended learning expectations. Therefore, it is a vital role of the educator to choose the best strategy that fits the respective content of the course that serves the students best to succeed in their learning experiences. To encourage a natural organic flow of student's dialogue, five to seven student engagement has proven the best for active, deliberative peer discussions. The research exhibit that, a larger group makes it more arduous for both the students and the educator to engage with each other.

Despite the several shortcomings of online education, there are fascinating aspects which can hardly be seen in physical education. One such instance is the encouragement of silent students in a face–to–face education platform to quit their role in online education. Irrespective of their nature, quiet, shy students get the obligation to participate actively in peer discussions. Thus, online learning has cleared the pathways for the quiet student category to voice their opinions, findings, and ethos. Yet, the dominant voices shall always be in the online platform.

Structuring groups either by random assignment or allowing students to form their own groups has its own merits. Research conducted related with group formation in these two methods implies that random assignment is more advantageous to the learner. The random selection of members for group activities enables students to move out from their comfort zone of the everyday group. They get an opportunity to meet a set of students with intellectual diversity, may be with cultural diversity as well. The group formation on the students' will unites friends characteristically having similar

beliefs and philosophies. Even though the students might refuse the random selection of group and urge to work with preselected groupmates, they would get an insight into the success of having a diversified group through their experience.

Questions from a Colleague: Effective Communal Building

This is another strategy that is meant for effective communal building. When deploying this concept in e-learning, the educator requests the groupmates ask for any assistance from each other in clarifying a question. In the event a student seeks more clarification, the question is posted in the online learning platform by the author with the heading "Question from a Colleague". This is done with the assumption that one question of a particular student represents a common question of all the students of the community. The anonymous question and the answer are posted on the platform to facilitate the community[3].

This strategy encourages the whole community to share knowledge with their peers and explore theories and problems by themselves. The passive students who are generally reluctant to raise their voices in a classroom to find a more secure place inspired to share their views and engage in a thorough discussion. Thus, active participation in the online learning process is achieved along with boosting interest in research and critical thinking.

Online Group Forums

Fostering reflective discussion in the online classroom certifies that students attain a high level of achievement in virtual courses. Offering an opportunity to engage in student peer exchanges on collaborative websites is unnoticed merit of the online education environment. Despite of geographic boundaries, interactive peer discussions through online means encourage academic reflection of the students[4].

Creating group forums for each group, with individual threads for answers and discussion, facilitates the students' further exploration of knowledge. The educator is supposed to post a guided question created based on specific content weekly. The individual answers of the students are expected to be posted under the answer thread before the stated deadline. A point deduction can be introduced for late submissions to educate students on their accountability and responsibility for their activities and consequences. The motivation towards the new process. The discussion thread is intended for the general discourse of the respective part of the course. Students are supposed to be a part and partial of peer learning. They are meant to provide answers to the questions posted as well as read the posted answers shared by their batchmates and develop a deep discussion on the respective subject area.

Along with student engagement, an educator is supposed to join the discussion and enhance the learning experience of the students. The course facilitator shall post questions apart from the students' queries. This is intended to provide gentle guidance to progress the students' discussion in deeper avenues and put them on a better track to proceed in the event the discussion is not up to the expected standards. Further, the facilitator shall highlight the specific contents of the course needed for a thorough exploration.

Gaming Tools for Communal Building

Game-based online learning platforms play a major role in communal building in remote education. These are designed to boost learner engagement by integrating gaming elements into the training strategy. Research exhibit that gamification has proven to record result with around 90% completion rates compared to typical eLearning courses. Therefore, gaming platforms have become a learning charm for students as well as educators in common, which enables communal building irrespective of the geographical location of the participants. Such gaming platforms include "Kahoot", "AhaSlides", "Quizlet", "MindTickle", and "Nearpod" etc.

Other Modes of Disseminating Knowledge

Dispensing the basic content of the course through power point presentation slides, the conventional mode of delivery holds its own merits without any argument. Yet, digital transformations of the era have facilitated students with numerous methods to access resources. In addition to the traditional resources provided by the educator, online courses, and social media platforms such as YouTube, and Ted Talk are proven to be useful in synthesizing and distributing required course content as well as a deeper insight far beyond the outline of the course. Other learning and teaching strategies, such as using screen capture, voice thread, articles, online magazines, and online interactive tools (Example: Mentimeter), provide students with resources and learning tools to match a variety of learning styles.

To sum up, there is no clear distinction between the overall objective of online education and conventional education. Both intend to open avenues for the students to develop excitement to learn, seek knowledge, and guide them on how to apply practically what they learn. Ensuring an active presence, guiding students through the learning process, and taking measures to enhance their comprehension of the learning content while nurturing a sense of proactive and student-centered learning are the true essence of lecturing. Promising this ideal in an online course conducted remotely requires proper organization, flexible structure, clearly defined boundaries, and transparent criteria for students to succeed[5].

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CHAPTER 9

Factors Affecting Attendance and Academic Performance at the Undergraduate Level

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Introduction

Currently, universities employ diverse teaching methods. Within this increasing diversity of tertiary education, lectures have persisted as a principal method of course content delivery to students. Also, lectures, tutorials and practical classes together form a major part of undergraduate teaching. Student participation in these academic activities is crucial in fulfilling the intended learning outcomes.

It is observed that there is a decline in class attendance worldwide. Previous studies by Newman et al.[1] have identified that a number of causes have contributed to a drop in class attendance. They identified the time schedule of lectures, pressure from assessments, the quality of the lectures, work obligations and other commitments as the top causes of students' absences. Age and gender had only a little impact on exam performance. Class attendance was highly associated with the place of residence and previous educational accomplishments. Additionally, there was a significant correlation between previous educational accomplishments and the place of residence.

Some higher education institutes have made attendance policies compulsory, while others have refrained from making them compulsory. Student personality factors and institutional factors affecting student attendance are summarized in Table 1.

Despite having different policies, educators at universities appear to agree that attendance positively impacts academic success, and absenteeism is a primary cause of poor academic performance. New information and technological advancements may have rendered traditional teaching techniques like lectures obsolete. Therefore, the assumption that undergraduate students benefit from attending classes should be tested[2].

Table 1: Factors Influencing Student Attendance

Student Personality	Institutional Responses
Personality type	Mandatory attendance
Student motivation	Electronic monitoring
Time management	Punctuality punishment
Peer group behaviour	Attendance without engagement
Attending lectures only to obtain assessment guidance	
Replacing attendance with an effective alternative form of study	

We should also consider the other factors affecting student academic performance. Main factors are;

- Demographic factors
- Personal factors
- Social factors

These factors are summarized in Table 2.

Table 2: Factors Affecting Student Academic Performance

Personal Factors	Social Factors	Demographic Factors
Cognitive ability	Social relationships	Poverty
Psychological wellbeing	Interpersonal relationships	Healthcare facilities
Academic engagement	Interpersonal communication	Age
Satisfaction		Gender
Positive attitude		Transport services

Exploring the relationship between attendance and examination performance will be helpful to both students and teachers. It is an institutional requirement to evaluate student attendance in academic activities and their impact on performance.

Missing classes could have many negative effects on students. According to studies, missing classes increases the student's potential of failing the course[3]. It disrupts the continuous engagement needed to follow

the course. As they struggle to cover the missed content, the increased workload will further increase their stress levels. Increased stress will have detrimental effects on them, including poor sleep, reduced concentration, depression, and anxiety.

Results of past international research suggest that class attendance has a significant positive effect on university students' exam performance[4]. More research in the Sri Lankan setting is needed for a holistic understanding. Also, the results of local research could be used to motivate students to increase participation in academic activities and increase the productivity of the institution. The following study highlights the importance of attendance in the local setting at the Faculty of Medicine at Wayamba University of Sri Lanka (WUSL).

Objectives of the Study

The general objective of this study was to evaluate the relationship between attendance in academic activities and the examination performance of students of the Faculty of Medicine WUSL.

Specific Objectives were;

- To describe the attendance in academic activities of students of the Faculty of Medicine WUSL
- To evaluate the relationship between practical attendance and examination performance of students of the Faculty of Medicine WUSL
- To evaluate the relationship between tutorial attendance and examination performance of students of the Faculty of Medicine WUSL
- To evaluate the relationship between lecture attendance and examination performance of students of the Faculty of Medicine WUSL

This study was designed as a cross-sectional study at the Faculty of Medicine, WUSL. Data were collected after obtaining permission from relevant authorities. Data analysis was done using SPSS software. Pearson correlation coefficient was used to assess correlations.

The Outcomes of the Analysis

Exploring the relationship between class attendance and academic performance in terms of examination results is helpful to students, teachers and policymakers. It is an institutional requirement to clearly understand student participation in academic activities and their impact on their performance. The main objective of this research was to evaluate the relationship between attendance in academic activities and the examination performance of students of the Faculty of Medicine WUSL. It expands the

prevailing literature on class attendance and academic performance with more focus on the local setting at WUSL.

This study was conducted as a cross-sectional study at the Faculty of Medicine, WUSL. The relationship between attendance of each subject with the relevant examination performance in that subject in 74 students was studied. Among the 74 students, male and female student percentages were 37.84% and 62.16% respectively. Age ranged from 22 years to 25 years. There were students from all nine provinces of Sri Lanka.

Table 3: Gender Distribution of the Students

Gender	Number of Students
Male	28
Female	46

Overall attendance of students was favourable with mean practical session attendance of 94% and mean tutorial attendance of 96%. Students who accessed online lecture materials through the Learning Management System were marked as present. Therefore, all students had 100% attendance for all the lectures. Table 4 presents the descriptive statistics of the attendance of students.

Table 4: Attendance of Students

	Minimum	Maximum	Range	Mean	Standard Deviation
Practical Attendance	71%	100%	29%	94.16%	7.47
Tutorial Attendance	58%	100%	42%	95.67%	8.52
Lecture Attendance	100%	100%	0%	100%	0

There was a significant positive correlation between attendance and written examination performances (Multiple Choice Questions + Structured Essay Questions) ($r = 0.30$; $P < 0.01$). There was a stronger significant correlation between attendance and Objective Structured Practical Examination (OSPE) performance ($r = 0.34$; $P < 0.01$). The correlation between attendance and total examination performance (MCQ + SEQ + VIVA + OSPE) was also significant ($r = 0.31$; $P < 0.01$)

These results signify the importance of active engagement in academic activities to score more in the components assessing the practical implication of the new knowledge acquired by the students. Though there is a limitation with the sample size, it can be concluded that active engagement

significantly influences the students' academic performance. Further, this can be repeated with a larger sample to confirm the impact and can be used to motivate students to increase participation in academic activities. Positive psychiatry principles could be used to motivate students and improve their attendance and academic performance.

Use of Positive Psychiatry to Increase Student Attendance and Performance

Positive psychology focuses on what makes life most worth living. Positive psychology is the scientific study of the processes and conditions that contribute to the flourishing or most favourable functioning of individual people, teams, and institutions.

Positive Psychology applied to higher education yields wonderful benefits. In the positive psychology approach, we focus on strengths-based approaches and increasing inherent motivation in undergraduate students. Strengths-based education focuses on student success rather than graduation rates and examination marks. Positive psychology empowers individuals to develop fulfilling and meaningful lives according to Schreiner, (2015)[5].

The positive psychology approach sees university courses that aim only to prevent negative academic outcomes (e.g., failing an examination, or dropping out of the course) as not adequate. Instead, the positive psychology approach targets "new opportunities and achievement for personal accomplishment, work on new and innovative solutions, emphasize the process of learning, and focus on strengths". Positive psychology research on education focuses not only on the strengths of students but also on the strengths of the staff, and the organization as a whole. Skilled and optimistic staff members and an encouraging environment will increase student engagement and performance.

As most universities focus on achievements and peak performance, it is common for individuals (both students and faculty staff members) to neglect their social connections and emphasise on extrinsic motivation (such as grades or promotions) over intrinsic motivation (such as learning or innovation). They put in excessive hours of work or engage in other behaviour patterns that have a negative impact on their well-being both immediately and over the long term (such as drug use or insufficient sleep).

Positive psychology has the potential to improve university life by influencing the growth of a higher education culture that recognizes the psychosocial factors affecting well-being (such as positive emotions, traits, and institutions). Positive psychology aims to foster an environment that promotes contentment in both students and staff.

There is mounting evidence that promoting well-being could be advantageous in academic settings. For instance, Lyubomirsky, King and Diener's meta-analysis from 2005 revealed that those who are happy are more productive at work, have more fulfilling relationships, and have better

health[6]. While most institutions work to cultivate graduates' positive traits (to prepare them for a dynamic life in modern society), many traditional tertiary education practices conflict with modern educational models and data emerging from the scientific study of well-being. Cross-cultural considerations are growing in importance because of the increased globalization of education and research.

Promoting the cultivation of mindfulness is one way to improve the quality of the experience of students and faculty and inculcate positive psychology. Mindfulness can be improved in various ways and practised in a wide range of personal and group activities, both inside and outside of official teaching situations[7]. The introduction of brief awareness exercises (such as body scans or focused breathing) at the start of lectures or tutorials or the provision of special areas where people can engage in more formal, structured forms of practice (such as meditation rooms) are both potential means of fostering mindfulness. It is encouraging to see how the principles and practices of mindfulness are starting to influence secondary and tertiary curriculum development. Compared to controls, in a secondary school interventional study, participants responded that they had fewer negative feelings, more emotional awareness and control, as well as improved feelings of peace, relaxation, and self-acceptance[8].

Training positive psychiatry skills to students and staff has many more benefits other than increased academic performance. Previous research has shown training positive thinking skills have positive effects on increasing happiness, increasing self-esteem, improving depression, increasing mental health, increasing progression, increasing motivation, increasing optimal functioning, increasing compatibility, and increasing subjective well-being. Positive psychiatry skills have also been shown to decrease addiction vulnerability, decrease stress and physical pain.

A novel framework for developing a Positive Attitude Towards Teaching in Higher Education (PATTHE) was introduced by Miočić et al.[9]. PATTHE framework focuses on four key areas. The four dimensions are

1. emotional dimension
2. constructivist approach to teaching
3. professional development
4. teaching and research connection

The first dimension focuses on the positive emotional relationship between the teacher and the undergraduate students. This could be attributed to positive emotions such as enthusiasm, pleasure, passion and empathy encountered in teaching practice. The second dimension promotes active collaboration in the formation of understanding and reconstruction of knowledge. Rather than the students memorising facts and information, students try to create their own understanding of the topic. Student-centred active learning is encouraged. The third dimension highlights the importance

of continuous professional development and providing such opportunities to teachers and students. The fourth dimension stresses the equal importance of teaching and research activities. One should not be considered inferior to the other. Academics should balance their contribution to teaching and research activities according to their preference and institutional requirement. Understanding that research activities and teaching activities could complement each other should be emphasized. Focusing on the above four aspects not only creates academically successful students but has also proven to flourish the lives of students and teachers.

Summary

Teaching methods in universities have evolved over time. Student participation in learning activities is crucial in fulfilling the intended learning outcomes. Student factors, institutional policies, and sociodemographic factors affect student attendance. In this cross-sectional study, we evaluated the relationship between attendance in academic activities and the examination performance of students of the Faculty of Medicine WUSL. There was a significant positive correlation between attendance and written examination performances. These findings emphasized the significance of active participation in academic activities. We also looked at the use of positive psychiatry as a tool to increase student participation and motivation. In institutions that practice positive psychiatry principles, students and staff show increased enthusiasm, well-being, happiness, and resilience.

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CHAPTER 10

Ingenious Techniques for Directing the Teaching-learning Environment to Elevate Students' Accomplishment

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Introduction

Within the scope of modern knowledge-based economies, the necessity for high skilled employees will continuously intensify the pedagogical systems. This has led academia to transform traditional "chalk talk" teaching approaches to modern customized approaches promoting student accomplishment and achievements. The aim of this article is to explore innovative pedagogical approaches for enhancing student achievements. Generation of such educational approaches requires knowledge-rich, evidence-based, student-centric education system laying the foundation for critical thinking and constructive arguments while extending a supportive learning, knowledge-based environment[1].

The process of teaching is how a teacher grasps the learning objectives, develops the teaching materials, and puts the teaching and learning methodology into action. For effective teaching, learning has to be a crucial factor leading to student achievement. In the higher education sector, the learners are expected to be treated as adults, where they grant freedom for questioning and evidence-based learning. Moreover, they expect the educators to be humorous, cooperative while utilizing creative and unique teaching techniques[2]. This is why students cannot pay attention for a forty-five-minute lecture session though they play video games all night. Uplifting student`s motivation to learn is challenging; yet critical to driving them to achievements.

The article explores the significance of ingenious techniques for the education sector to refine and redirect its pathways for student accomplishment and different novel methods available in the turbulent environment to redefine the teaching-learning systems.

Significance of Ingenious Educational Techniques to Enhance Student Accomplishments

One cardinal reason for the necessity of indigenous pedagogy methods is the inadequacy of inclusive learning in higher education considering the learning barriers faced by the learners. Hence it is important critically evaluate the effectiveness of different teaching techniques utilized and their effectiveness in directing the students towards achievements, which identifies the necessity of the innovative learning methods to be used. Collaborative and student-centric learning is prevalent among internet generation students in a turbulent environment with technological enhancement. This has made educators to replace traditional learning with modern and student-centric teaching techniques. The core component of learner-centred education includes several interactive technologies, such as web-based or internet-based learning and teaching[3].

Also, the modern labor market requires employees who think rationally. Hence the main aim of the modern education system should be to recognize the gravity of generating intellects who can think rationally and out of the box. With high exposure to the information today, the students also expect their educators to be more creative in nurturing them to improve their cognitive thinking abilities leading them towards the way of right thinking[4]. This further evidence the argument that the real product of education is an intellectual process. Further, traditional methods of teaching are inadequate as its main focus is on fundamental skill development such as reading, writing, counting and memorizing curriculum for a closed classroom examination. The method lacks the encouragement learners are to receive to achieve higher and better through cognitive thinking. In contrast, modern pedagogy motivates learners to achieve higher and better through critical thinking.

In the recent past, the scope of knowledge has been widely expanded with human`s ability to adapt to knowledge in the environment and technology. This has made modern teaching and learning pedagogy to become the only survival mean in the knowledge-based era replacing the spoon-feeding traditional pedagogy with ingenious, modern teaching techniques. Creativity and innovation have transformed educators to think beyond the generic "chalk-talk" education system to modern teaching approaches.

Further, modern inventive teaching approaches have never failed to fulfill the demand for new learning techniques from the learners to face

challenges, hands-on experience and sharpen skills required by the modern labor markets.

Hence, the above evident necessity for an educator to identify the most effective and modern teaching method to enhance student performance and achievements. Regrettably, the use of modern pedagogy techniques within the Sri Lankan higher education sector is a rare sighting compared to the global context.

According to a study carried out by Johnson, the following components can lead to effective classroom management motivating student learning;

1) fostering productive collaboration with students
2) educating students about how learning occurs in your classroom
3) safeguarding and utilizing time
4) foreseeing behavior of the students in well-designed lesson plans
5) creating behavioral rules that support student learning[5]

Features of Modern Teaching Techniques

Learner Centric

The most primary feature of modern pedagogy is its learner-centric nature. This has taken place with the transition from spoon-feeding teacher-centric behavior to modern learning techniques. The technique has enabled the learners to involve directly in the; learning process while educators facilitate the learning process. The learners dominate under the student-centric culture as they act as "knowledge generators" rather than traditional "knowledge receivers".

Activity Based

The modern education systems involve attempting tasks and activities rather than memorizing a chalk talk lecture. Students` engagement in learning has been improved this way, making an attempt more interesting and valid to find knowledge by themselves rather than spoon-feeding.

Resource Based

Modern teaching-learning pedagogy requires more resources than traditional learning to enhance its interactivity and effectiveness. As most modern techniques are experiential in nature resources and technology outside a closed classroom will be required.

Interactive and Integrative Nature

Modern learning is both interactive and integrative. It does not only facilitate a single learner to get the knowledge but a pool of peers. This further enables peer collaboration.

Methods of Ingenious Educational Techniques

From traditional brick-and-mortar education systems of memorization to modern pedagogical education systems of interactive, active and student-centric learning, there have been visible changes in the education sector over decades.

The student is the primary focus of the contemporary teaching approach while developing the curriculum and preparing lessons. This refined education system has enabled the development of a better teaching-learning ambience, enabling the students to enhance their educational attainments. This section will explain the commonly used modern and indigenous teaching techniques in the higher education sector[6].

I. Inquiry-based Learning

The method stimulates active learning and independent analytical skill development. The method enables the educators to act as facilitators encouraging the learners to explore the materials themselves. The method is effective in encouraging interaction and motivation of students. The approach, however, is only useful when the necessary information is delivered in the context of actual issues or circumstances and is in line with the curriculum. The students will be provided with a scenario and encouraged to find a solution embracing collaboration[7].

II. Collaborative Learning

Isolated learning has been replaced with collaborative learning. The collaborative learning technique enables the students to work together to solve a common task or problem or a scenario debating with one another to clarify the queries. The technique allows students to expand their knowledge faster, meeting different personalities while developing social skills. Further, this group learning technique will enable the learner`s to exchange creativity, and face healthy criticism and cross-questions. The method can be implemented in class with fewer resources and effort.

III. Flipped Classroom

The flipped classroom technique is among the most widely used and popular modern teaching techniques. The teaching takes place in a flipped manner. The method reverses the traditional teaching technique of referring content at school and practice at home to refer content at home and practice in school. The method is about completing homework at school and doing the studies at home, converting the school into the centre of practical education. The technique enables the students to observe the topics in depth and research through different perspectives. Doubts can be clarified in class with classmates and teachers. Further, it enables the students to work at their

own pace and the lecturer receives the ability to provide one-one supervision.

Additionally, the approach enables the students to conduct study by viewing a video tutorial, online search, or working on the material that the lecturer routinely provides. One of the most significant benefits of the method is that students` sickness will not affect their studies as most of the learning is done through self-exploration.

IV. Spaced Learning

This is the repeating of a session multiple times till a student understands. Yet the repeats are done with two 10-minute spaces (break) in between the lessons allowing a space or gap to refresh the mind engaging in physical activity to prepare them for the next repeat session. The method enables the student to grasp lessons slowly yet effectively building connections between the lessons learnt. The method will improve both physical and mental health while reducing obesity through the involvement of physical activities.

V. Gamification

The method is to conduct teaching through games. Though the method was introduced initially for preschool and elementary education, the method is valid for higher educational institutions as gaming cannot be limited to a specific age. Gamification has made learning entertaining and unrestrictive. Online quizzes, puzzles and brain games are some of the widely used techniques. However, the lecturers should ensure the design of the right games based on the age and maturity level of the audience.

VI. VAK Teaching

The method divides learners into three groups: Visual, audio and kinesthetic. Visual refers to seeing the data, audio means hearing or gathering and kinesthetic means feeling the data. The method is introduced considering the differences among students in gathering data and the students are expected to present the same materials differently. Student classification to VAK can be done either by the lecturer or the student himself. The method was introduced in the 1920s, yet its applicability to modern contexts is high with its ability to stimulate learners for speedy learning through different senses.

VII. Self-learning

Curiosity arousal is one of the best teaching techniques as it can make students to remember things for a longer time period. Also, self-learning can motivate students to explore things in depth. This will enable an educator to make the learners` to develop their creativity, independent

learning, and rational thinking abilities, inspiring them for higher achievements and progression.

VIII. Project Based Learning

Projects were merely included in the traditional curriculum yet have become prominent in the 21st century education system. It is the allocation of tasks and case studies based on the student`s pursuing field. The students will be required to find the optimum solution for the issue by applying the knowledge in the relevant field.

IX. Experiential Learning

Similar to project-based learning, experiential learning is a modern teaching approach enabling students to get exposed to real-world scenarios providing the experience. This may be in the form of role-playing and fieldwork[8].

X. Kinesthetic Learning

The knowledge is best captivated when delivered through practical examples under the kinesthetic method allowing the learners to obtain a wide range of hands-on experience, translating for better learning outcomes. The method is also prevalent in the name of the tactile learning approach.

XI. Problem Based Learning (PBL)

PBL is a cyclical process that begins with a question leading to a chain of questions. The method gets complex with the continuation however generates a pool of knowledge and information. The method will enable the students to improve their creativity, motivation, and problem-solving ability and expands knowledge-sharing skills.

XII. Blended Learning

As the name implies, the method is a combination of traditional and novel learning systems. Though the introduction of blended learning runs back to decades, its validity was highly admired during the COVID pandemic. The method enables the learner and teacher to utilize the benefits of both traditional and conventional learning. Station rotation, flex learning and virtual reality are some tools used under blended learning[9].

XIII. Dramatization

Living with a problem is the best way to find a solution. Dramatization will allow the learner to behave in a situation through their imagination and creativity. The expectation of the method is to find the optimum solution by living in it. Role plays, and informal dramas are some examples of dramatization[10].

XIV. M-learning

In the modern technological era, the method enables learning to occur via multiple electronic devices such as handheld laptops, MP3 players, mobile phones and tablets which can be conveniently accessed at any given point.

XV. Story Telling

This teaching method enables the learners to solve problems playfully and comprehensively. The process enables the students to learn and memorize easily with a minimum learning effort. The method facilitates to explaining expectations, defining expected behaviour and strengthening the character. When the lesson is convertible to a related story, it will be convenient for the students to maintain attention and enjoy learning.

XVI. Use of Artificial Intelligence

Artificial intelligence (AI) is a prevalent concept in the modern era and is currently used inside the classroom. The technique has reduced the workload of lecturers; and customized the learning environment and curriculum. Currently, AI is widely used in course management, assessments, adaptive learning and parent-teacher communication.

XVII. Peer Teaching

This is the learning technique of knowledge sharing with peers. One to share knowledge, it is critical to first understand the context thoroughly. Students will allow to select their area of interest and given the autonomy to teach the content to their peers correctly. This will reduce the workload of the lecturer and simultaneously enhance the learners` ability for in-depth analysis, presentation skills and confidence[11].

XVIII. Peer Feedback

Another effective way of learning is the receipt of constructive feedback on one`s own work. This will enable the learner to critically evaluate peer effort and frequently provide valid feedback for improvement. Reflectively the one receiving the feedback can improve his listening and tolerance ability to maintain an open mind while providing more insights on the effort to fine-tune it.

XIX. Jigsaw

The method embraces teamwork and knowledge sharing. The operationalization of the approach is similar to the jigsaw puzzles. Under the technique, the students will be categorized into small groups and assigned smaller topics under the main topic to explore and develop their ideas. Each group will construct knowledge to facilitate the big picture building based on the assigned topics.

XX. Students as Autonomous Learners

This enables the students to become the owner or leaders of their education. This new approach has made it feasible for individuals to claim ownership of their own learning, in contrast to the traditional teacher-centric learning model. The teachers may act as facilitators to support the students while the majority of the learning is carried out by the individuals independently in a customized manner. The method will lead the students to enhance their independent and critical research abilities[12].

Benefits of Modern Teaching Pedagogy

Enables a Better Interactive Teaching-learning Experience

Modern teaching pedagogy has made students to conveniently and comfortably learn with applications, simulations and video games. This has enhanced the students` level of engagement and interaction, leading to higher productivity. This will enable them to improve their research abilities and cognitive skills for the betterment of future career progression.

Enhance Real-time Learning and Learning at Own Pace

The involvement of technology has enhanced individuals` ability to take control over their own learning and improved flexibility through inventive pedagogies such as blended learning and spaced learning. This will enable the students to socialize with a stronger sense of belongingness[13]. Also, the method will allow the student to learn at their own speed with effective time management.

Accessibility to a Wide Range of Information from Multiple Sources

Modern teaching pedagogy will enable the students to search information through a wide array of sources enthusiastically. Unlike studying a traditional textbook, a student receives the ability to enhance knowledge with a few clicks while reading complex professional literature and work.

Creates More Engagement and Collaboration

Modern pedagogy can create a more engaging environment than traditional closed classroom learning. The method makes two-way communication and a high level of interaction between teachers and peers possible within the education system leading to more increased collaboration[14].

Twiducate, epals and myViewBoard are a few educational applications and sites to enable collaboration. Encouraging teamwork and collaboration tracking are two significant benefits.

Enables Learners to Learn New Skills and New Knowledge

Inventive pedagogy can enable learners to improve multiple skills and expand their knowledge with the use of numerous teaching-learning techniques through online platforms.

Builds Mental and Physical Health of Students

Modern teaching techniques enable the students to be physically and mentally strong with collaborative and active learning methods. Techniques such as spaced learning enable students' physical and psychological growth by motivating their interactive and active participation in educational arrangements[15].

Accommodates Multiple Learning Styles

Effective learning rejects the concept of a "one-size-fits for all" approach to replace learning with multiple learning styles and techniques. The differences in benefits can be optimized with the use of multiple techniques catering to different student groups, such as auditory learners (best to spoken rather than written words), visual learners (rely more on sight than sound) and tactile learners (find active learning best)[16].

Preparation of the Students for the Future

Education is about preparing the upcoming generation for the rest of their lives. As we are stepping into a high-tech savvy era with intensive competition, it is essential to enable the future generation competent to face possible opportunities and challenges which are generally unpredictable. Modern teaching approaches enable the students to "think beyond boundaries" stimulating by improving critical and cognitive thinking to think about issues arising and prepare for the challenging job market.

Provision of Instant Feedback to Lectures

Inventive techniques have enabled teachers to obtain instant feedback via two-way and interactive communication modes. Raising questions and obtaining student feedback on their understanding real-time is a good sign of ensuring the effectiveness of education and motivating the students for studies.

Efficiency and Personalization

Modern use of technology and online applications have uplifted the efficiency level of lecturing with the help of multiple technological devices and applications to maintain students` attention. This has further enabled the lecturers to provide specific attention to each student personalizing feedback for improvement and achievements.

Conclusion

Preparation of the students for modern learning is equally important as delivering them education through modern techniques. The skills to use under modern teaching pedagogy are important for both teacher and learner to optimize the efficiency and effectiveness to motivate the students for higher achievements. The following considerations have to be addressed:

I. Provision and encouragement of students to use technological devices.
II. Familiarizing with advanced technology to assess their benefits and drawbacks in identifying the most effective teaching technique to approach the students.
III. Researching the students` ability to utilize technology and their willingness to share knowledge with peers.
IV. Eliminating physical problems occurring with the use of modern teaching techniques.

Modern pedagogy techniques will enable the learners to effectively and enthusiastically continue their studies collaboratively and cooperatively. Summarizing modern teaching technologies are restructuring learning to meet global standards. All those have their benefits and drawbacks; hence the teachers should analyze them in depth with the maturity level of the students to make an effort fruitful by using the most effective technique/s. Also, teaching approaches are different based on subject disciplines where to become a good lecturer, lecturer should pay more attention to learning factors. It is simple to enhance the quality of learning and, ultimately, generate a successful graduate by identifying different learner types and using appropriate creative and engaging teaching approaches. In conclusion, it is imperative for educators to enhance student engagement through active learning, foster inclusion among students throughout the educational process (experiential and blended learning), and reconcile outcomes with faculty and student expectations through evaluations. If the educators can, it might be simple for them to be innovative in controlling behaviour, to effectively communicate, to be in charge, to be consistent with the rules, to provide choices and change themselves.

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CHAPTER 11

Social Constructivism in Teaching and Learning

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Origin of Constructivism

It is assumed that the concept of Constructivism has evolved from the period of Socrates. He believed that teachers and learners can build up unseen knowledge through effective interactions between them[1]. Furthermore, philosophers state that constructivism hails from psychology and philosophy[2].

What is Constructivism?

Constructivism is one of the concepts embraced very recently. This is considered as one of the best methods that can be used in teaching and learning. Teachers and other educators have given a number of meanings to constructivism. One such is that "constructivist stance maintains that learning is a process of constructing meaning; it is how people make sense of their experience"[3].

Constructivism is commonly used to test the level of students' understanding. Further, it depicts how proper understanding leads to extensive thinking[4]. Philosophers expect that the teachers would understand students' education level, and let them apply it in practice. Therefore, scholars have placed constructivism as a leading theory in the educational sector.

None has found a general definition for constructivism. Thus, scholars believe it is more likely a learning, knowledge, science or an educational concept.

What is Social Constructivism?

Social constructivism is a theory of knowledge and communication developed together by a set of individuals[5]. It is sociological and states that knowledge is created when individuals work with their peers. Thus, when students work in coordination with their peers, they would develop a level of understanding and meaning.

Social constructivism is a blend of knowledge, learning and reality[6]. It assumes that reality is formed by human activities. Knowledge is created as a human product embedded in social and cultural aspects[7]. Learning is also a social process which is passively developed by external forces[8]. Moreover, interactions and collaborations result in meaningful learning.

Social Constructivism of Vygotsky

Famous psychologist Lev Vygotsky (1896-1934) is the founder of the Social Constructivism theory. The name suggests the impact of culture, language and socio-cultural development on the education of an individual. This theory argues that meaningful learning is a personal process achieved through cultural knowledge and the understanding of an individual.

Zone of Proximal Development (ZPD)

ZPD is a novel concept introduced by Vygotsky under the Social constructivism theory. This is the zone where a student needs the assistance of peers or adults in solving a problem. Students cannot solve the problem alone in this zone. Therefore, teaching targeting the ZPD of student would increase the level of learning.

Figure 1: Zone of Proximal Development (ZPD) of a Learner

Social Constructivist View of Teacher

In Social Constructivism, teachers are referred as facilitators[9]. The reason highlighted is the difference between the two terms. A teacher

initially gives everything in a lecture to the students, whereas a facilitator lets the students understand the content on their own. Students play active roles when facilitation is done instead of teaching.

The learning environment should support the learner, and at the same time, it should challenge the learner. Instructors are encouraged to let the learner understand the problem and find solutions, but should not consider any solution adequate. Most importantly, instructors may play the roles of consultants and coaches, which would help learners expand their scope and become effective thinkers[10].

Social Constructivist View of LEARNER

Social constructivism theory has given priority to learners. It is essential to motivate the learners and reward them. It boosts the genuine thoughts of learners, which are backed up by their own culture. It further emphasizes the importance of learners' interactions with educated people in society. Young children improve their thinking abilities when interacting with peers, elders and the community. Others should be well aware of learners since it directly affects their knowledge and achievements[11].

Social Constructivist View of Learning

Social constructivist scholars admire the presumptions and intuitive thinking in students. Learning never ends. Thus, scholars expect learners would find novel facts and philosophies by themselves. Individuals learn from their environment and by interacting with one another. Hence, reality comes up with someone's social interference. No one can predict the reality earlier.

There are four general outlooks of social constructivism on learning[12].

- Cognitive tools perspective: Focuses on the importance of learning cognitive skills.
- Idea-based perspective: States that special concepts in various disciplines, such as photosynthesis in science etc. expand the vision of the learner.
- Pragmatic/ emergent perspective: States that social constructivism should be implemented as needed in a classroom.
- Transactional perspective: States that people belong to the environment and are created by the environment.

Social Constructivism and Classroom

Constructivist teachers use several novel methods in their classrooms[13].

- They encourage student creativity and inventiveness.

- They use key data sources to arrive at important decisions.
- Constructivist teachers use cognitive terminology when structuring the assignments.
- They use student responses to modify their lesson plans and contents.
- Constructivist teachers ensure the students properly understand the concepts taught before communicating more information on the topic.
- They encourage teamwork, group discussions and dialogues with both teachers and peers.
- Constructivist teachers encourage students to raise questions and engage in verbal communication to enhance their knowledge.
- They pay attention to student responses and elaborate upon those to enhance the learning process.
- Constructivist teachers give extra time to the students and wait patiently until they analyze questions and give explanatory answers.
- They always let students build relationships with their peers also teachers.
- Constructivist teachers arouse student curiosity over three steps. First, students ask queries, next, the teacher focuses on student thinking, and at last, students apply their solutions to problems.

Vygotskian concept of constructivist differs significantly from the traditional classroom in the following ways.

Table 1: Traditional Vs Constructivist Classroom[14]

Paradigm	Traditional Classroom	Constructivist Classroom
Approach	Begins with parts of the whole, stresses basic skills	Starts with the big picture, then growing into parts
Knowledge	Similar knowledge is shared	Dynamic, changes with experience
Teacher	Directive and authoritative	Interacts, negotiates with learners
TLM	Textbooks and workbooks	Primary sources, manipulative materials
Assessment	Test and correct answers. Product is more important than the process.	Student participation, works, observations, points-of- view, tests. Process is more important

Potential Conflicts

While the majority accepts social constructivism as an idle approach to teaching and learning, few researchers state the drawbacks of this concept.

Few teachers refuse the role of facilitator because they lose control of their classrooms. Since teachers are given a standard syllabus to cover, losing control of the classroom has also been a concern at national levels[15].

Additionally, many students find that they need a set of different skills to move with constructivist learning[16]. Moreover, excess activities of constructivism overburden many students and disturb their normal learning processes[17].

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Section 03

Adoption of Technology to Advance Student Achievements

CHAPTER 12

Application of Modern Technology Tools for Advancing Student Achievements

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Introduction

Increased student diversity and enrolment in higher education have highlighted the importance of enhancing student learning experiences since the mid-1990s. Although drastic manoeuvres to achieve this objective were not very noticeable, the recent COVID-19 pandemic commanded the changes in a very short time span. Blended learning (i.e., face-to-face and online), an alternative learning method, has massively influenced and diversified learning activities. Online education was, back then, a complementing approach, which now has become a fundamental facet of the teaching and learning process. Contingent to the transformation of the traditional teaching-learning approach, the premise of an adequate evaluation of the student's perceptions of the learning environment is indeed necessary. In turn, their study approach and learning outcomes should ultimately link to the relationship between blended learning, student learning experience, and eventually, overall achievement[1].

According to Entwistle et al.[2] the factors determining the quality of learning are illustrated in Figure 1. It is quintessential to consider the seven principles for undergraduate education which are elaborated by Chickering and Gamson[3]. These principles include "encourage contact between students and faculty", "encourage cooperation among students", "encourage active learning", "give prompt feedback", "emphasize time on task",

"communicate high expectations" and "respect diverse talents and ways of learning". To quantify the learning experience of the students, it is essential to consider a compelling integration of these principles into the learning ecosystem design[4]. Lizzio et al.[5] noted that successful implementation alongside the execution of these principles by instructors significantly correlates to how students embrace studying and the results they achieve.

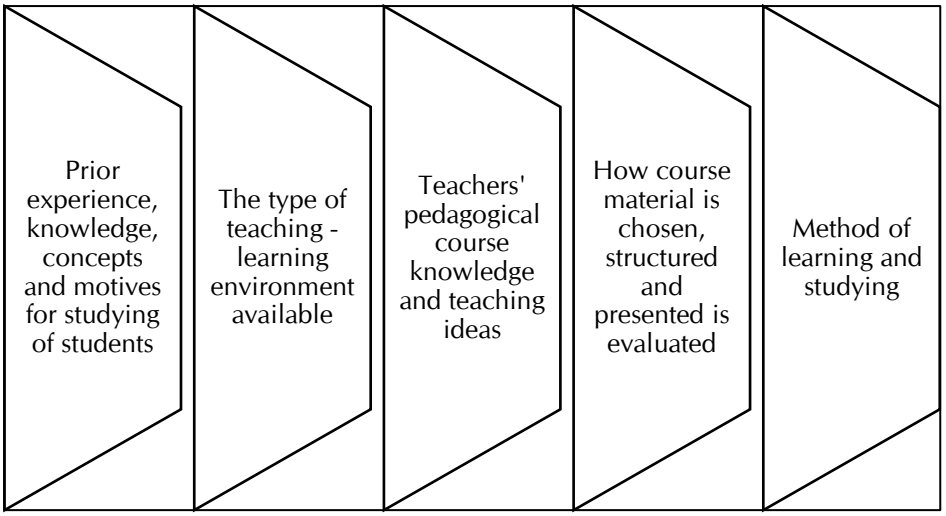

Figure 1: Key Components Associated with Quality of Learning at Universities

Distance Learning

Online, herein referred to as distance learning, is a recent trend in education where the learners (i.e., students) and the facilitators are physically separate. During the distance learning activity, a well-organized learning experience instigates through various two-or multi-way-mediated media channels. This facilitates and supports the interaction & communication between/among learners, facilitators and even allows easy access to educational resources[6]. This spatial separation made a difference in the traditional ideology in approaching the traditional face-to-face learning methods.

Communication is a key factor to consider in terms of ideological differences. In the era of COVID-19, communication techniques have grown in leaps and bounds and have remarkable importance in making learning effective. As Bozkurt [7] mentioned, "The prominence of teacher-centred education has diminished, and education has become more learner-centred", which is undeniably true[8]. With the benefits and increased capacity offered by information and communication technology, contact between teachers and students, as well as among students, has become the core emphasis of distance education. In contrast to the newer, higher-quality computer-based multimedia, the previous generation of multimedia

becomes obsolete, and synchronous and asynchronous instruction becomes as comparable to face-to-face instructions. Moreover, new learning paradigms, such as mobile learning, e-learning and ubiquitous learning, have emerged as auxiliary tools. Learning has taken precedence over teaching, and it has promoted the concept of lifelong learning. Distance learning has now become an integral element in student education through platforms such as Coursera, edX, LinkedIn, etc. (Figure 2). These occupy permanent space on the internet, thus keeping all records available to encourage lifelong learning.

Figure 2: Popular Distance Learning Platforms

The merits and demerits associated between technology and learning in distance methods are tabulated in Table 1. Notably, the highlighted hurdles stated here are inevitable, as the transition would take a prolonged time. However, the student's achievement and competence must be accounted for. To this end, the compulsory use of technology and its merits should be assessed, and proper approaches should be followed to ensure students achieve the technical know-how of the technology being practised. Since teaching with technology affects students in different ways while learning, this should never be made another hurdle for the students. If such shortcomings are not redressed, it will make the entire learning process more medium-literate. Modelling and optimizing technology within our

disciplines and classes are compulsory to teach technology effectively. Thus, workshops are recommended to bridge the technical gaps and demonstrate efficient ways of handling vice threads, blogging, Prezi, social bookmarking, podcasts, and screencasts to mould and manipulate the content properly. The addition of smart boards, interactive whiteboards, Moodle, chat rooms, discussions board, webinars, emails, social media in classrooms, and image creators are also noteworthy.

Table 1: Benefits and Challenges of Distance Education[1]

Benefits	Challenges
Improved learning outcomes for students	Unrealistic expectations for students
More adaptability for instructors and students	Perceived isolation of students
Enhanced self-awareness, introspection, and research abilities Lower student dropout rate	Issues with technology for students
Fostering a professional learning environment	Invasion of other spheres of existence, commitment to time
Potential reductions in expenses and resources	Difficulty learning new teaching and technological skills, a lack of support for course reform

Novel methods of providing access to information and opportunities for critical thinking, which make students either operate individually or in networked communities to foster new understandings and discussions for new solutions, are also favourable. It is noted that such mobile learning systems in education have the potential to ascertain ubiquitous learning[9]. Customization of the Moodle facilities is one prominent way of approaching modern tools to advance/spur the student's capabilities. According to published research, using LMS and Moodle improves learning outside the classroom and improves students' academic performance, thinking, and creative abilities[7]. Interactive Moodle sessions with rich visual and audio engagements, polls, and interactive quizzes would get the students' attention, despite the learning environment. Further, Table 2 emphasizes the assessment methodologies and supportive technologies, which could better entail the learning and outcome procedures with all the constraints[10].

As a progressive manoeuvre, guiding professionals on how to adapt the web-based curriculum for knowledge integration is essential. A digital planning tool that permits evidence-driven design decisions, which may inspire by learning objectives and comments of pupils to encourage the delivery of more customised or adaptable teaching, is yet another option. With the aid of such planners, teachers can organise, rearrange, delete, or learn activities inside units. Such tools allow educators to adapt with respect

to student feedback and present content more attractively by colour-coding the content overview of all learning activities (elicit, explore, distinguish, reflect). Educators use technology to facilitate students' personalised learning processes. As a result, if educators implement customisation in remote learning environments with suitable planning and customisation tools, these will significantly improve student achievements and positively impact their learning.

Table 2: Technology Integration for the Effective Assessments[8]

Assessment Methods	Supportive Technologies
Diagnostic evaluation	• Concept maps/Mind maps • Questionnaires on the Web platform • Interactive and gamified presentations
Evaluations using video tags	• Videos on YouTube or published on the Web platform • Video annotations • Questionnaires on the Web platform
Group and collaborative analysis	• Videoconference platforms • Text and video annotations
Self-assessments	• Online questionnaires • Rubrics • Questionnaire on the Web platform
Objective tests	• Multiple response questionnaires
Interviews	• Videoconference platforms
Ipsative assessments	• Rubrics • Tools on the Web platform
Oral partial or final exams	• Online presentations • Videoconference platforms • Self-recorded videos by the student • Test reports • Plagiarism tools
Final evaluation	• Automated marking systems • Randomized questionnaires • Open camera examinations

Artificial Intelligence (AI) for Effective Teaching and Learning

The integration of AI into the learning environment, of course, yields numerous benefits in the education sector. Presently, AI is widely utilised to improve the interactivity and effectiveness of online learning platforms. There is an abundance of data accessible, which can be used to improve the present teaching platform for students and teachers. An effective framework based on AI for continuous lecture note generation, quiz creation, near-real-time language translation, and, most crucially, lecture outcome evaluation can be employed for greater productivity. Robust machine learning (i.e.,

component of AI – Figure 3) allows several agents to develop a shared, effective machine learning model with or without sharing data, allowing them to address crucial challenges such as security, data privacy, and access rights[6].

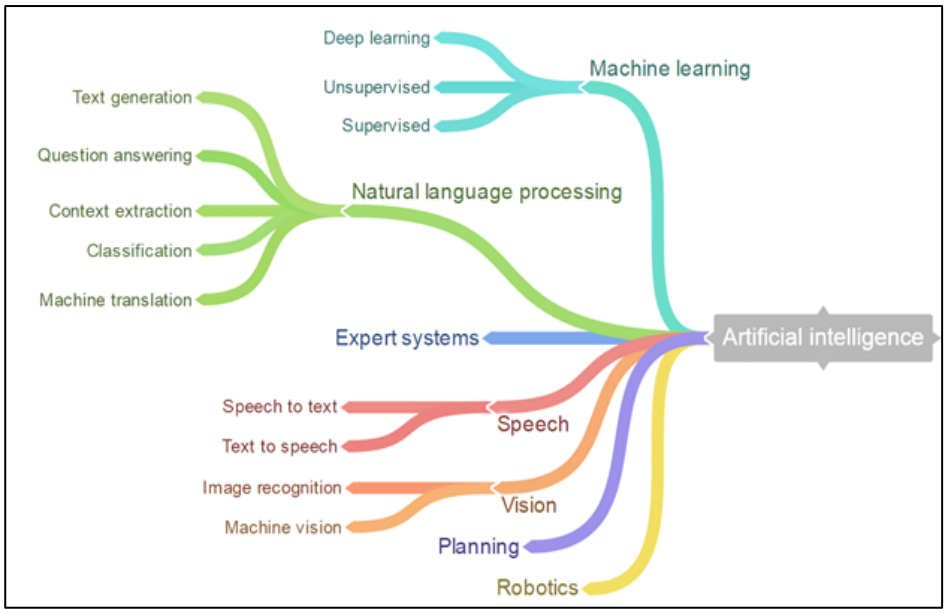

Figure 3: Components of Artificial Intelligence (AI)

Moreover, AI is employed to deliver individualised feedback and realise individualised learning in online higher education and is currently practised in top universities. It has become an impressive tool for monitoring student performance and student behaviour in class using the domains within deep learning (Figure 3). Additionally, AI drives the development of tools such as Kahoot not only offers attractive means of education but also motivates students to actively participate in the online classroom breaking the monotony. It is reported that AI-powered games enhance the cognitive skills of students[11]. The most noteworthy games include Code Combat, Code Monkey and Thing Translator. Besides the theory or practical-based skills offered by the well-known AI tools and methods to enhance student soft skills are attracting attention.

AI has reserved a special place in the research domain, where it has become a sensational buzzword. Evidently, the conventional labour-intensive hand calculations are now superseded by using AI. Thus, encouraging students to engage in AI-related activities (i.e., teaching and learning) is immensely favourable for a brighter future. Despite being comparatively difficult to digest at first sight, the importance of AI should be properly communicated to all students, thereby permitting them to improve the quality of their achievements.

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CHAPTER 13

Digitalization and Novel Approaches of Managing Teaching-learning Environment to Spur Students' Achievements

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Introduction

An open learning environment has been hastened by the digitalization of society, changes in the structure of education, and more rapid resources. As students become increasingly disconnected from the actual world, their ability to maintain attention on learning objectives is hampered, and their cognitive load is raised. These and other issues are all exacerbated by the use of mobile devices in the classroom. More than just the latest educational ideas or methods are offered by teaching and learning, which is a continuation of e-learning and mobile learning, where this system can cater to educators and their learning styles by providing sufficient information at any moment and anywhere based on the attributes, needs, and desire of students to improve academic performance and productivity.

Effective technology integration in education requires a specific educational ecosystem to be created where the educational process takes place, where pedagogical skills, subject matter, and technology are combined. Participation in curriculum revisions by teachers has been a challenge, but it is essential for their personal and professional development. Numerous fields of work have been able to adjust in response to an unusual epidemic as a result of improvements in their capacity for communication, learning, and action made possible by technological advancements.

A transition in the role of teachers is called for at all levels, with a focus on students, increased participation, collaborative work, learning autonomy, and the development of competencies and skills to meet the challenges of the twenty-first century. [1]This active methodological renewal is intended to help teachers meet these challenges. Team-building exercises can be used to foster innovation, as well as open-ended problems that may take a semester to answer. Students are more likely to find a solution to an issue if their teacher provides them with stimulating and imaginative prompts. An environment that encourages and supports students' exploration of innovative solutions to problems is necessary for these strategies.

Creative Ways to Engage Students

Assumption Busting

One of the most effective ways to break out of a mental rut is to challenge one's assumptions. Everyone has preconceived notions about the world around them, which can obstruct our ability to notice or generate new options when trying to be creative. Creative thinking is sparked when previously unchallenged assumptions are deliberately sought out and addressed.

Example: Make a list of the assumptions that are associated with a task or a problem, such as the assumption that a solution is impossible due to time and cost constraints, the assumption that something works due to certain rules or conditions, and the assumption that people believe, need or think of certain things. The next step is to determine the circumstances under which these presumptions are incorrect and then continue the process of examination as previously held assumptions are called into question, and new ones are developed.

Fishbone

The use of a fishbone diagram to identify the various sources of an issue is referred to as the fishbone technique. An important component of solving a problem is ensuring that all the pieces fit together in a clear and understandable way.

Example: On a large piece of paper, draw a long horizontal arrow heading to the right across the middle of the page. Identify the problem by labeling the arrowhead with the issue's name. This is the "fish's spine." Label each of the "spurs" that emerge from the "backbone" at a 45-degree angle, one for each possible source of the problem. For example, a spur may be a subordinate cause of another. The group examines each spur and sub-spur in turn, starting with the simplest explanation possible in the hopes that it will eliminate the need for more sophisticated ones. With the most critical

problem at its head, fishbone diagrams should be redesigned so that their position on the backbone reflects their importance in relation to each other.

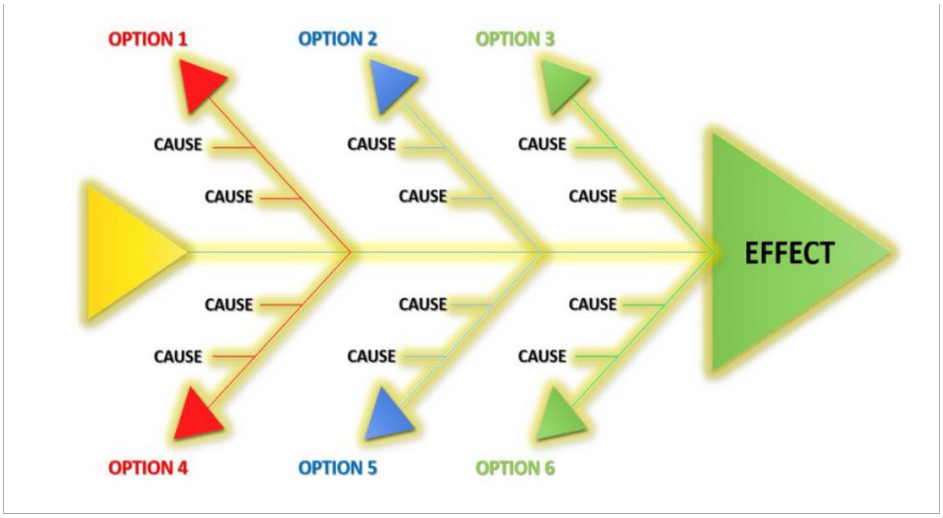

Figure 1: Fishbone Diagram

Role-playing

As part of their studies, students often engage in role-playing activities in which they take on the identity of an individual who has been adversely affected by the topic under consideration.

Example: Students should be able to put what they've learned into practice by participating in role plays. Students will be able to perform their roles with confidence if they are given clear instructions and role descriptions. Spend some time debriefing at the end of the role play.

Negative (or Reverse) Brainstorming

In contrast to conventional brainstorming, which begins with a massing of ideas, negative brainstorming begins with an analysis of a short list of current ideas. When an idea is new or complex, or when there is minimal room for error, it's important to look at possible failures. Thinking of all the ways this idea could go horribly wrong is a hallmark of negative brainstorming. There are times when finding a direct answer to an issue calls for the use of reverse brainstorming.

Example: Asking "How could I produce this problem?" after articulating a problem or challenge is a good first step in solving it. or "How can I make this situation even more difficult?" Allow thoughts to flow freely, just like you would when brainstorming, without rejecting any of them. By analyzing these unfavorable viewpoints, we may be able to come up with creative answers.

Impact of Digitalization on Managing the Teaching-learning Environment

A global epidemic induced by COVID-19 has prompted academic institutions to implement digital teaching methods, speeding up the incorporation and application of technology in methodological adaption. Below are some techniques used by teachers during the pandemic periods[2].

Zoom

Zoom is a video communications tool that runs in the cloud and enables users to conduct virtual video and audio conferences, webinars, live chats, screen-sharing, and other forms of collaborative work.

Figure 2: Zoom

The vast majority of the state universities in Sri Lanka take advantage of the Zoom platform to provide lessons on pandemics, particularly fuel emergencies.

Microsoft Teams

Microsoft Teams provides an online learning environment that enables students to take full control of their own learning. Teams make it simple for students and teachers to work together and are available on any device.

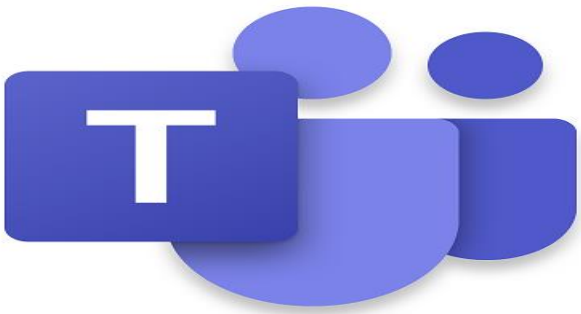

Figure 3: Teams

Mobile Learning

M-learning, or mobile learning, is a novel method of accessing educational content via mobile devices, such as smartphones and tablets. If you have a smart mobile device linked to the Internet, you can learn whenever and wherever you want.

Merits of Using Novel Approaches of Managing the Teaching-learning Environment to Spur Students' Achievements

The Ability to Think Critically and Creatively is Improved

Students should be given the freedom to conduct their own study, discover the causes and effects of events, and then come to their own conclusions about difficult environmental issues. It fosters a new generation of informed consumers, workers, and policy or decision-makers by developing and enhancing critical and creative thinking abilities[3].

It's a Win-win Situation for Everyone

Community involvement fosters a sense of location and connection. Local experts, donors, volunteers, and other facilities can help students learn more and take action to enhance their neighbourhood's environment by connecting them with other members of the community.

Environmental Improvement is the Result of Ethically Sound Behaviour

It cultivates the knowledge and skills necessary to solve complex environmental concerns, as well as the ways in which we can take action to guarantee that our environment is healthy and sustainable for future generations[4].

Students and Teachers are given the Ability to Make their Own Decisions

It encourages active learning, civic engagement, and student leadership among students. It enables young people to express themselves and make a difference in their schools and communities. It aids educators in developing their own environmental expertise as well as their ability to instruct others on environmental issues.

Summary

Digital technologies are rapidly altering our daily lives. Students must have digital skills in order to meet the rapidly evolving digital demands in today's digital age especially in education. As a result, promoting digital education has become a critical need in the modern era. Effective digital-age teaching necessitates a high level of professional knowledge and skill. As is customary, these innovations create new opportunities while posing new

challenges. As a result, digitalization and novel approaches in managing the teaching-learning environment help to motivate students for their achievements and education.

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CHAPTER 14

Techniques and Practices to Manage Online Teaching-learning Environment to Spur Students' Achievements in the Turbulence Environment

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Introduction

As academics, we can be proud of our own performance in our work based on the success of our students. The teaching-learning environment is extremely important to student success. Therefore, for a successful teaching-learning environment, creating a supportive learning culture, addressing learner needs, receiving and focusing on feedback, valuing learner success, and ensuring a safe teaching-learning environment are very important factors.

The purpose of this article is to present the importance of new online teaching methods that can be used to maintain a successful teaching-learning environment in the turbulent environment that has emerged in the current socio-economic crisis.

Upgrade the Infrastructure

In a turbulent environment, the university should take necessary measures to carry out the student's studies well. Much attention should be paid to the improvement of the ICT infrastructure of the university. For that, the university should look for the necessary configuration and minimum requirements and present suitable alternative solutions. Here, it is necessary

to introduce new learning devices, new changes that can be made to the LMS, new capabilities that can be added, and characteristics and limitations. Apart from this, it is also very important to provide solutions to the practical problems of the students as far as possible. For example, to encourage students with poor internet access, changes can be made, such as providing small exercises that are easily accessible. Through such measures, students can avoid many problematic situations that have to be faced through online teaching-learning and engage in studies well.

Figure 1: Online Teaching-learning Tools

Prerecorded Video/ Lecture Recordings

In online teaching methods, "Pre-recorded video lectures" play an important role in maintaining a good teaching-learning environment. Here, the student can study at any time without the teacher and refresh his memory. According to the teaching process of a traditional class, the student has to take notes and remember what he has been taught. But pre-recorded videos/lecture. But pre-recorded videos/lecture tapes will provide tremendous value to the students who cannot be achieved through the traditional method.

Here, in the turbulent environment of a socio-economic crisis, the students have to face problems, not being able to participate in the lectures due to power cuts does not cause the lessons to be missed. There, students can do their studies properly without worrying about a power cut.

This will help to maintain a good teaching-learning environment, maintain a supportive learning environment and look into the needs of the

learners. In this way, even in a socio-economic crisis, pre-recorded videos and lecture recordings will be beneficial in maintaining a good teaching-learning environment.

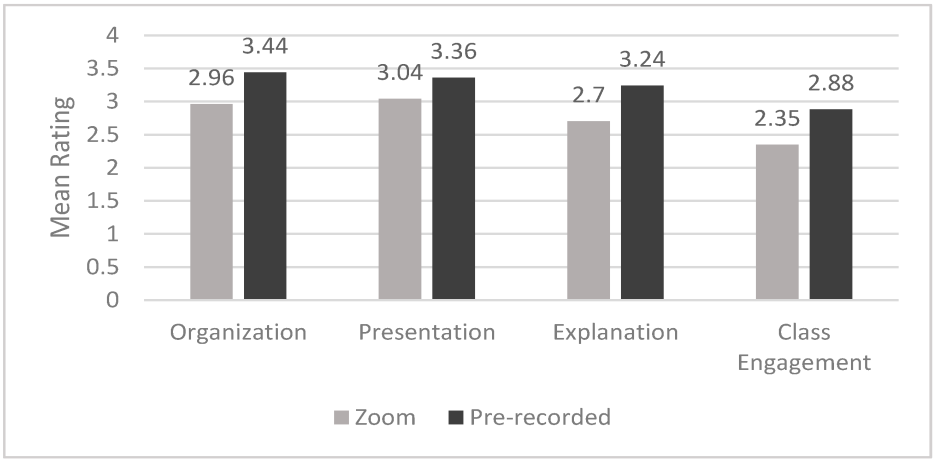

Figure 2: Mean Rating of Zoom and Pre-recorded Lectures[1]

Planning in Advance

Compared to an actual physical classroom, a virtual classroom can quickly become confusing. And when you are confused like that, it is difficult to correct the situation in the virtual classroom. Therefore, it is essential to plan the online lecture well in advance. In this way, the lecturer can gain the confidence of the students and will be able to know what the students are doing. These points; scheduling the online class and inviting the students in advance, preparing the materials including multimedia files that you want to display through the class, planning the time for the lecture in advance and confirming it through practice, starting the lecture on time, and finishing on time can be addressed while planning the class.

If there is no proper time management, students will dislike your session and students will join your session later or leave early. Then the positive teaching-learning environment will collapse. It will adversely affect student success. By informing the students of the lecture schedule in advance, they will be able to prepare for the lectures or inform the teacher about their difficulties in the face of the problems that the students have to face during the socio-economic crisis.

Experiment with Graphic Elements

In online teaching, great care should be taken in preparing the lecture material. This is because the focus of the students in the lecture is mainly based on the lecture material. Therefore, an important point to keep in mind is that, especially in virtual lectures, the huge amount of words in

the lecture material can cause students to lose focus. Therefore, using graphics as much as possible in the preparation of lecture material will help maintain the students' attention. It is also a good way to open a notepad in a separate window and describe by drawing a sketch. This method can be used most successfully in a virtual teaching environment.

That way, students can easily understand the theories and can maintain a good permanent memory. Then students will develop a desire to maintain focus even in virtual learning and a sense of security in the learning environment[1].

Group Activities through Breakout Rooms

Group learning is a peer learning method that can be done well in the physical classroom. But the option of "breakout rooms" that many video conferencing tools provide can help make this group learning process even more successful in a virtual classroom. This breakout-room option allows for group activities in the virtual classroom, similar to a physical classroom.

Breakout rooms give students a sense of 'privacy' while allowing them to present their ideas better. And the teacher can also quickly switch to breakout rooms and check if the students are working well. It is more convenient than a physical classroom. This will make it possible to create a supportive learning environment even in a virtual classroom. Through peer learning, students will be able to develop their knowledge, share their knowledge with others and thus confirm their knowledge. It will also be possible to improve the inter-processes. That way, even in an eco-social crisis, positive teaching-learning will be created, stress will be reduced, and it will help them to go towards success[2].

Mid Mapping

Mind mapping is another good online teaching method that can be used in this turbulent environment. A mind map is a diagram with ideas and concepts needed for the teaching process. It can also be called organizing information or a resource that can be used to do assignments.

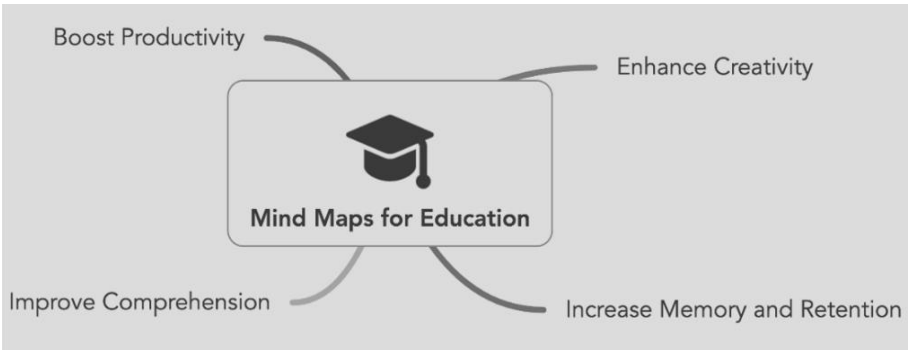

Figure 3: Advantages of Mind Mapping Concept

This can be used by teachers in many ways in teaching, such as in classroom discussions and bringing everyone's ideas into a common view. This is a very convenient online learning method for students. Because this is quick, convenient, and allows them to come to the same idea easily, in this way, students can create their own mind map as they want during online learning, and can easily share it with other students and exchange their ideas about it. And mind mapping is suitable for making connections between ideas/concepts, Project planning or writing and for getting a better understanding of the learning material[3].

Flipped Classroom

A flipped classroom is the opposite of a traditional classroom. There, lecture materials are given to the students before the lecture, they are given the opportunity to refer to them, and then the problems of the students are discussed during the lecture.

In view of the problems in the socio-economic crisis, teachers will have the opportunity to give lecture materials to the students in their free time, and the students will get them at their convenient time and refer them at their convenient time. Here the student will feel safe in the new teaching-learning environment. It will be very helpful for the success of the students.

Online Whiteboard

Online whiteboard is another good online teaching aid. In addition to the main lecture material, the online whiteboard can be used for explanation. There, students can experience a traditional whiteboard, and there are pre-made templates that can include various diagrams and charts. In addition, it will be possible to re-distribute and refer to later. In this way, the needs of the students will be well met, and they will be able to engage in learning activities without stress.

Game-based Online Teaching

Game-based teaching is a highly effective method of online teaching. This will increase the involvement of the students in the lecture and will be able to maintain their attention. Also, weak students can join their peers and develop their knowledge. Game-based learning makes it possible to attract students who are interested in learning as well as students who are not interested in learning to the lecture. That is, the students who are interested in learning will be able to relax their tired minds and engage in learning activities with more enthusiasm, and the attraction of students who are not interested in learning will be increased towards the lecture. There are various tools for online game-based teaching. Padlet, Mentimeter and Nearpod are some of them. This enables teachers to prepare teaching materials in a very

creative way that is pleasing to the eye. This increases the willingness of students to participate in lectures even in a problematic environment.

Live Chatting

Live chat is a virtual environment that recreates the real-time discussion that takes place in the traditional classroom. Live chat is an event similar to the conversation between the teacher and the student during the lecture that takes place in the traditional learning process. Through these discussions that take place in the traditional learning process, the student will be able to confirm the knowledge acquired through the lecture. In the online teaching and learning environment through live chat, the student will have a great opportunity to find answers to their questions. Examples of live chat are Zoom, Slack, Whatsapp, Viber, Facebook messenger, etc. Here, students will be able to present the problems that arise when preparing for a test to the teachers at any time, the teachers will also be able to communicate with the students at any time, and brainstorm during a lesson. This will enable students to maintain a good teaching-learning environment despite the problems that arise in the turbulent environment[2].

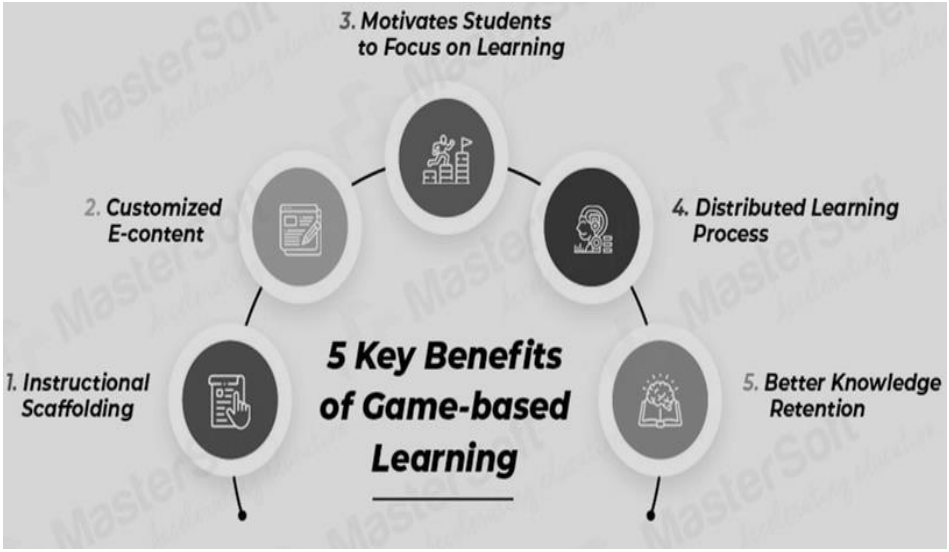

Figure 4: Advantages of Game-based Learning

Summary

All these online teaching-learning practices and techniques; upgrading the infrastructure, prerecorded video/lecture recordings, planning in advance, experimenting with graphic elements, group activities through breakout rooms, mid mapping, flipped classroom, online whiteboard, game-based online teaching, and live

chatting can be used in a creative manner to create a successful teaching-learning environment to spur students' achievements in the turbulence environment.

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CHAPTER 15

Inventive Effort for Directing the Teaching-learning Environment to Boost Accomplishments of University Students

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Introduction

The world is evolving at a fast rate. It is necessary to innovate academic community, learning, and teaching if one hopes to keep producing graduates who can thrive in that changing environment and who are prepared to be leaders of tomorrow. Every university hopes to establish a learning and teaching environment that is among the best in the world. Students expect to gain the skills that they need at universities in order to leave their imprint on the world. Students learn more effectively when they feel like they are a valuable element of their academic community.

Teaching and learning are unrepeatable, and the student always needs the guidance of a good mentor or coacher to reach the ultimate goal of his/her life. The success of the teacher can be determined by counting the number of students who learn things. The teacher must always adapt a teaching style based on the learner, using various teaching techniques depending on the subject matter, the number of students, and the classroom's amenities. Every class is made up of a diverse group of students with a variety of skills, knowledge, and goals. It is the responsibility of the teacher to help each student advance to the next stage of their lives by using a variety of teaching techniques, as such conversations in groups, independent presentations, assignments, forums, conferences, role-plays, and case analysis[1].

However, approaching the competitive world with traditional classroom teaching and learning techniques would not always be beneficial in this century, where learners are more active and desire cutting-edge educational techniques that don't confine them to the status quo. Regardless of the fact that distance learning was not a prominent teaching and learning method in Sri Lanka, it has become a necessity attributable to the pandemic and economic crisis, which many universities and even private institutions have taken into consideration in order to solve the challenges. Students of the Internet generation enjoy interacting with one another in a setting that encourages comprehension and learning. Therefore, learner-centred teaching strategies are preferred by students, while teacher-centred strategies are outmoded. The key component of learner-centred teaching is Internet-based or web-based learning, and teaching, in particular, uses interactive technologies[1].

As stated by Team[2], the teacher-centred approach places the teacher at the centre of the action and controls the learning process. In contrast, the learner-centred approach emphasises students actively participating in their own learning and being encouraged to make their own discoveries. Whereas Teacher-centered learning is defined by Huba and Freed[3], as follows: The emphasis is on knowledge acquisition, and the teacher's duty is to serve as the primary information provider and primary assessor. Personal development of the student is not allowed, and the statement of student-centred teaching is better comparatively further confirmed by Brown[4], where the findings stated a student-centred learning strategy empowers learners by empowering them to make decisions and judgements regarding the applicability of the material and instructional strategies to their own lives and interests.

Based on the findings of McCombs & Whisler[5], the perspective known as "learner-centred" emphasizes the students' experiences, viewpoints, backgrounds, talents, interests, and needs. It generates a learning environment that is conducive to learning and promotes the best levels of motivation, learning, and achievement for all students. To accomplish learner-centred teaching, Weimer[6] listed five changes that were necessary. These include the selection of the subject matter, the role of the teacher, the student's obligation to learn, the technique of evaluation, as well as the student-teacher power dynamics. The curriculum needed to be designed with student input, and some levels of education needed to be the responsibility of the students. Corresponding to this, Bain[7] outlined a number of characteristics of teachers who use learner-centred teaching. These attributes consist of the capacity to influence students' lives, the significance of their focus on learning and outcomes through a range of evaluation techniques, and the effect on career goals.

Nevertheless, Additionally, it was agreed that giving lectures in person is simpler and more interactive than distance learning, which has the teacher stay in one spot while students learn while residing in another suitable area. Therefore, in response to the increased emphasis on innovation skills, numerous efforts have been launched globally to encourage and evaluate excellence and innovation in university teaching[8]. Universities are being compelled to reconsider their teaching methods because of the rapid pace of technological advancement. The universities must decide how to respond to the many new online teaching and modular education providers that are emerging on the international scene. It is crucial that Universities seize the chances presented by emerging technology for university instruction. Because they were raised in the digital age, today's students learn in new, engaging ways. It's essentially impossible to discuss higher education without bringing up innovation. Despite the platitudes, innovation in higher education isn't just about getting ahead of the competition; it's also about remaining sustainable and relevant in a volatile global world. Additionally, it involves intentionally modifying teaching and learning approaches in order to foster innovation, foster creativity, foster cooperation and advance inclusion and diversity[9]. Further, she has claimed the necessity for institutions to think creatively and use their inventive mindsets is, therefore, crucial as higher education standards rise.

Creating an Innovative and Captivating Classroom Teaching Environment

Innovation in the classroom should constantly consider how it might help students perform better. Promoting learning is the aim of instruction. We use tactics that encourage learning. An iterative procedure can assist us in successfully and effectively enhancing learning by having students try out various strategies. There are various innovative and attractive methods that can utilize in the teaching environment; 1) Interactive education, 2) utilizing virtual reality apparatus, 3) AI in the classroom and 4) blended education support in creating an innovative and interactive teaching environment are some of them[10]. Thompson[11] also has stated on blended learning.

1) Interactive Education

Create an atmosphere where students feel encouraged to speak up and express their thoughts because one-way lessons are very conventional and can occasionally be stressful for both teacher and students. There are other ways for students to participate in class activities besides just raising their hands or being called upon to respond. These days, the teacher may create engaging classroom activities with the aid of online platforms, saving a tremendous amount of time and including the entire class as opposed to just two or three[10].

2) Utilizing Virtual Reality Apparatus

With the aid of virtual reality technology, explore a whole new universe inside the classroom. Students can immerse themselves in various settings and interact with 'real' objects rather than viewing them on flat screens, similar to watching a 3D movie or engaging in VR games. Now the class can visit a different nation in a matter of seconds, journey to the Milky Way in space, or study the Jurassic period while dinosaurs are present just a few meters away. Although VR technology is pricey, it can make any lecture exciting, making it a worthwhile investment[10].

3) AI in the Classroom

Who says artificial intelligence (AI) can't be used in education when it makes so much of our work easier? In actuality, this technique is surprisingly popular right now. Using AI doesn't mean it takes place entirely and accomplishes everything. Unlike in science fiction films, robots and computers wander around and instruct our students (or brainwash them).

It makes it easier for lecturers like to manage their workload, customize their curriculum, and train students more effectively. Undoubtedly, many familiar AI technologies are used, like LMS, plagiarism detection, automatic scoring, and evaluation[10].

4) Blended Education

A technique called blended learning mixes high-tech online teaching with conventional in-person instruction. It provides teachers and students more freedom to design individualized learning environments and experiences. Ignoring potent resources like the internet or e-learning software in our highly technological society is challenging. The world has been changed by innovations like online video conferencing for educators and students, learning management systems (LMS) for managing courses, social networking and gaming websites, and various apps for studying[10]. By integrating in-person and online learning options, blended learning allows students more discretion over the scheduling, place, course, and pace of their education. See our previous post to learn all a teacher needs to know about blended learning. Because it provides both traditional classroom experiences and online tools and learning possibilities, blended learning is exciting. It's not an all-or-nothing strategy. However, technology plays a significant role in blended learning, just as it does for students in the real world. Due to blended learning's flexibility, students can choose their preferred learning style more freely. For example, they may decide to join lecture-based virtual classrooms and complete their homework on their own while watching online lectures at home.

It further emphasized and recognized 5) Flip the classroom method as another way to create a teaching environment more innovative and interactive[11,12].

5) Flip the Classroom

In flipped classes, students read their lecture notes at home and finish their projects and assignments in class. In a flipped classroom, students finish the assignments that are usually assigned as homework in class. The flipped classroom greatly facilitates peer-to-peer cooperation. Students can work together to complete group assignments, hold conversations, and engage in practice. The teachers are not the main focus of the flipped classroom. Instead, teachers are more flexible, offering specialized help and direction to both individuals and groups of students as they do their work[11,12].

Moreover, the new studies identified 6) Formative analytics[12], 7) Teach back[13], and 8) Place-based learning[14,15], as novel contributors to create an innovative and interactive teaching environment.

6) Formative Feedback

The use of fine-grained data and direct feedback to students in the form of dashboards or feedback has a significant impact on educational practice and leads to innovation. Notably, rather than waiting for feedback from a teacher to be supplied at the end of the assessment activity, students can seek formative analytics whenever they want or request formative analytics that is tied to their own self-regulation strategies. This is a fundamental departure from traditional pedagogies that either demand that students assume complete responsibility for their learning outcomes or place the teacher at the centre of the learning process[12].

7) Teach Back

In Teach-back, the discussion partner could be a live tutor, a classmate, an AI system that provides a "teachable agent," or another individual. When attempting to teach a teachable agent a newly learnt topic, a student can display a dynamic map of the concepts the computer agent has learned. The computer may then try to teach the information back. As an alternative, AI methods can improve human teach-back by aiding and providing resources for a fruitful discourse, such as conducting an information search or defining a term. Also, the teach-back variation has been illustrated by using computers[13]. For instance, one person served as both the student and the instructor after learning about herbal medicines from a book. The student then made an attempt to learn more about the same issue by calling the teacher who was more knowledgeable. The two people's phone conversation was continuously monitored by AI software that identified keywords in spoken speech. When the AI program recognized

a word or phrase in the dialogue, it flashed beneficial information on the learner's screen but not the teachers' (such as the name of a medical herb or its qualities). By providing the student with constructive criticism, the conversation was balanced, and both parties were able to have more fruitful discussions.

8) Place-based Learning

Place-based learning reestablishes the connection between learning and local contexts at a time when educators are under pressure to conform to national curricula and a globalized society[14,15]. It strives to restore students' sense of place by using neighborhoods as a unique environment for experiential and problem-based learning, and to support them in recognizing the learning opportunities in and from local community settings. It can be used as a technique to decolonize curricula, acknowledge that various groups of people may have diverse interpretations of the exact locations, and encourage the inclusion of many points of view. Digital and networked technologies increase the potential for both group and individual learning by establishing connections with and exchanging knowledge with a wide range of stakeholders, allowing for flexibility in learning, and promoting larger-scale interactions. Networked technologies provide access to global resources and learning away from the internet thanks to smartphones and tablets, which are increasingly owned by students, as well as other digital instruments linked together for data gathering, analysis, and reflection on interactions. Context- and location-aware technologies can activate learning resources on mobile devices and improve physical settings using augmented reality tools, which may dynamically overlay data layers and context-sensitive virtual information.

09) Learning with drones[16], and 11) Citizen inquiry[17] found as support in making innovative and interactive teaching environments are novel advanced tools identified in this context.

9) Learning with Robots

The robot can play a variety of functions and be involved in the learning activity to varying degrees. It appears that in some instances, the robot plays a more passive role[16]. When that occurs, it can be used to instruct students in programming by having them guide a robot along a physical path that is littered with obstacles. Robots can either function as students' classmates and study with them, or they can take on the role of a teacher. A robot teacher to aid in language acquisition is the "interactive cat" (iCat) created by Philips Research. It can display emotion and has a mechanically produced cat face. This was a crucial component in terms of social support, which is a crucial quality of human teachers. The robot tutor's socially

encouraging behavior improved the learning of the students. The iCat tutor demonstrated supportive non-verbal characteristics such as smiling, focusing attention, empathetic conduct, and communicativeness.

10) Learning with Drones

While on field trips, drones enable students to complete previously unfeasible tasks like peeping inside inaccessible sites or observing a scene from multiple viewpoints. There are several possibilities for studying physical objects and space. Digital literacy can be combined with other skills and literacies, like orientation and motor skills, through drone-based learning. By showing students how professionals—such as land surveyors, journalists, police officers, and many others—use drones in their line of work, it is also a creative technique to link classroom learning with real-world application. It has also been proposed as an assistive technology that would enable students without mobile devices to remotely access websites; otherwise, they would not be able to access it[17].

11) Citizen Inquiry

One of the peculiarities of this technology is that it allows any person to take part in and understand scientific operations typically conducted behind the closed doors of experimental facilities. All people should be able to think scientifically in order to engage critically and take their environment into consideration. This goes beyond just scientists. Such skills will enable more critical comprehension of societal debates like those surrounding false news as well as more involved citizenship. Platforms like nQuire, whose goal is to scaffold scientific research and assist the development of pertinent skills among citizens, can support the development of these skills technologically.

Moreover, according to the literature, there are some other methods for creating an innovative and interactive teaching environment through 12) Personalized Learning, 13) Project-Based Learning (PBL), 14) Inquiry-Based Learning, 15) Jigsaws, 16) Ask Open-Ended Questions, 17) Peer Teaching, 18) Feedback and 19) Active Learning[11].

12) Personalized Learning

Individualized instruction that adapts what, when, and how we teach each student is provided. Instead of employing a single approach or plan to teach the entire class, teachers adapt to the strengths of each student to help them achieve. Similar to how teachers use different online tools, where algorithms tailor them to teachers' preferences, the personalized learning experience. When a teacher visits one website, the teacher might notice that some content appears at the top, but depending on viewing habits or

searches, the teacher might see something different. With personalized learning, each student receives a unique learning experience and instructional strategies tailored to their needs. The ultimate goal of each student's tailored learning journey is topic mastery or meeting grade-level standards.

13) Project-based Learning (PBL)

Students can effectively guide their own learning through the use of project-based learning. Students pick a real-world issue and then create a remedy as part of a PBL assignment. Building crucial skill sets, including investigating, critical thinking, problem-solving, and cooperating, are essential to project-based learning. Project-based learning enables students to use their knowledge in real-world circumstances as opposed to rote memorization. The teacher serves as a guide while the students take ownership of their education, similar to the flipped classroom.

14) Inquiry-based Learning

Learning through inquiries fosters critical thinking and problem-solving abilities. The teacher asks questions, presents scenarios, and creates challenges rather than lecturing the class. The students then do individual or group studies on these subjects to come up with their conclusions. Together with the other students, they can present their findings and supporting materials to the class. After hearing what other students have discovered, students can further expand their responses by highlighting areas that need more focus and detail.

15) Jigsaws

Another way of active learning is jigsaw puzzles. Jigsaws most critically present the chance for pupils to instruct other students. Additionally, as "We learn while we teach" The protégé effect states that the greatest way to comprehend something properly is to explain it to someone else. Students are separated into groups and provided various pieces of knowledge when using jigsaws. The next step is for each group of students to understand the material thoroughly enough to be able to impart it to someone else. The pupils are then put into several groups where they are required to share their knowledge with others. They continue doing this until each group obtains the necessary data to finish the problem.

16) Ask Open-ended Questions

Students, especially those who are successful, could rely too much on textbook solutions. They might eventually start to believe that there are only correct and incorrect responses. However, the majority of questions

have no right or incorrect responses. Students must practice communication skills and empathy in the contentious public arena of today. Students must develop their communication and teamwork skills. Teachers foster engaging class discussions by posing open-ended questions. Students can put together coherent points by combining various pieces of knowledge or life experience. This may inspire pupils to express themselves as well as find their voice.

17) Peer Teaching

Whenever students' instructor explains to others, they show mastery, as we described when talking about jigsaw puzzles. Request that students choose a course-related topic that they are passionate about. Give students the opportunity to research the topic on their own and create a presentation about it. Permit students to speak during class so they can educate their classmates on the topic of their choice. Students increase their self-assurance, independence, and presentation abilities through peer teaching.

18) Feedback

Getting feedback is crucial. Accepting and providing constructive criticism are skills that students need to develop. Set up a system for students to give feedback. Emojis and polling are excellent feedback tools for virtual classrooms since they allow fast feedback cycles. Students can be challenged or asked to elaborate on their input, after which the teacher can ask students with opposing views to explain why.

19) Active Learning

Active learning tactics made up a large portion of the novel learning approaches. Students are encouraged to contribute, participate, research, and create through the use of active learning techniques. Students are put to the test via active learning, which necessitates problem-solving and critical thinking. The main benefit of active learning is that it keeps pupils interested and involved in the lesson. Students that actively engage in their education are more likely to perform well in class.

Boosting Student Achievement through an Innovative and Captivating Classroom Teaching Environment

On the basis of learning theories, one must incorporate whether the teacher is employing the proper teaching methodology. The effects of several educational ideas on learning are evident. Examples from learning theory can have an impact on a teacher's method of instruction and method of classroom administration.

Table 1: Combine Educational Theories with Creating an Interactive and Innovative Classroom Teaching Environment.

Main Theory	Sub Theory	Interactive Teaching Method	Education Theory Supported by Interactive Teaching Method
Cognitive Theories	Constructivist Theory	Jigsaws, Peer Teaching, Inquiry-Based Learning	New information adds to what students already know, so they can layer it on top of what they already know.
	Social Constructivist Theory	Flip the classroom	Prior to internalizing new information, students first acquire it through social contact.
	Cognitive Constructivist Theory	Citizen inquiry	Entails setting up discovery learning & scientific experiments & allowing students to figure it out themselves.
	Bloom's Domains of Learning	Citizen inquiry, Ask Open-Ended Questions, Active Learning	Higher-order learning typically enables students to exhibit more depth of understanding & practical application of a topic.
	Cognitive Load Theory	Blended education	Giving students too much knowledge at once might cause "cognitive overload," which slows or stops learning. Blended learning can help in this case.
	Gestalt Theory	Active Learning, Ask Open-Ended Questions	Students look for unity and order in the material they are taught. To better understand the subject of the analysis, one must see the "full picture." When simply grasping a portion of something, they lack the comprehensive comprehension necessary to form insightful judgments or deep critical insights.
	Pragmatic Education	Project-Based Learning	Project-based learning allows an understanding of the purpose of learning theory

Behavioral Theories	Classical Conditioning Theory	Utilizing virtual reality apparatus, AI in the classroom, teach-back, Learning with robots, Learning with drones	If two things frequently arrive together, associate them with one another.
	Operant Conditioning Theory	Utilizing virtual reality apparatus, AI in the classroom, teach-back, Learning with robots, Learning with drones	can learn a certain behavior if the process includes either positive reinforcement or punishment.
Social and Cultural Theories	Social Learning Theory	Utilizing virtual reality apparatus, AI in the classroom, teach-back, Learning with robots, Learning with drones	Learning can occur by observing how other people behave.
	Sociocultural Theory	Personalized Learning	People with various social and cultural backgrounds could learn in various ways.
	Situated Learning Theory	Place-based learning, Project-Based Learning	Instead of learning in a classroom, students should experience real-world situations or workplaces where the new information they are learning can be applied.
	Play-Based Learning Theory	Utilizing virtual reality apparatus, AI in the classroom, teach-back, Learning with robots, Learning with drones	lately been applied to the field of digital play, where theorists contend that playing on digital devices can provide similar advantages to traditional play as well.
Humanistic Theories	Humanist Theory of Education	Formative feedback, Interactive education	Teachers will perform at their best when they have complete faith in the students' skills. Students should receive "unconditional good regard" from their professors.

(Source adapted from Drew, 2022[18])

Finding the right approach can mean the difference between a boring classroom and one that's interesting (even if it involves combining two or more learning theories).

Advantages of Learning in an Innovative and Captivating Classroom Teaching Environment

As presented, the following mentioned advantages can be acquired through implementing innovative and interactive methods to create a teaching environment[10].

1) *Inspire students to conduct research*
   Innovative teaching strategies encourage students to delve into new realms of knowledge and acquire new skills.
2) *Enhance critical thinking and problem-solving abilities*
   Students can study at their own pace with the use of creative teaching methods, which encourage them to come up with innovative solutions to problems rather than relying on pre-written ones in textbooks.
3) *Avoid getting a lot of information at once*
   Teachers that use innovative methods still give students information, but they usually break it up into smaller chunks. Information may now be more easily absorbed, and teaching the fundamentals quickly aids students.
4) *Adopt more soft skills*
   Students are required to use more sophisticated tools in class to complete their work, which encourages learning and creativity. Additionally, students are better able to prioritize assignments, manage their time, communicate, collaborate with others, and so much more when working on individual or group projects.
5) *Verify students' comprehension*
   Grades and exams can only reveal so much about a student's aptitude for learning and level of knowledge (particularly if there are covert glimpses during exams!). Teachers may keep an eye on classrooms and learn more about the issues that students face so they can find the best solutions by using innovative teaching strategies.
6) *Enhance self-evaluation*
   With the help of excellent teaching strategies, students can identify what they have learned and what they still need to learn. They can better comprehend why they should study specific topics by determining what they still need to learn on their own, which will make them more motivated to do so.
7) *Liven up the classroom*
   Avoid having awkward silence or a lot of voice in the classroom. Innovative teaching strategies give students something new to be

enthusiastic about, which motivates them to speak up and engage in more conversation.

It emphasized that with technological development, it is necessary for universities to think beyond the classroom teaching methods, still supporting the learning theories. It also showed that creating an innovative and interactive teaching environment based on one concept would not always be ideal. Therefore, the application of innovative and interactive teaching environment methods is required to be carefully selected, applied and tested.

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Section 04

Novel Distance Learning Approaches to Enhance Teaching-learning Process in the Higher Education

CHAPTER 16

Teaching-learning Environment Empowered with Novel Distance Learning Approaches to Enable Achievement-oriented Student Community in the Higher Education Sector of Sri Lanka

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Background

The teaching-learning process is the foundation of any great civilization generating immense potential in its society. From inception to the end, human beings engage in teaching-learning. The education one receives and delivers highly depends on the teaching-learning environment that he/she engages in. A totality of all services and physical facilities focusing on education creates a decent teaching-learning environment. Adopting effective approaches in that environment may generate an even more sustainable teaching-learning environment by providing inspirational stimulus for both learners and educators. It improves the level of confidence and motivates both parties to achieve more output than expected. Higher education is a pivotal element in the education sector of any country. Thus, it directly contributes to the development process. Having an effective teaching-learning environment with blended approaches in the higher education sector is a worthy and surely rewarding investment.

However, the traditional way of learning and education has been deeply threatened due to the recent global pandemic and sluggish economic progression. Hence, many countries are compelled to seek solutions and are presently in a transitional stage. Given the situation, it is a fact that all most all countries are undergoing experiments and introducing various novel

approaches to enhance the experience of both learners and educators. Distance learning is one such powerful and effective concept that has immense possibilities for developing the education sector in a country. In reality, it breaks many barriers which suppress education for all. Distance learning acts as a catalyst in the continuous teaching-learning process; thus, learning communities around the world are rapidly embracing it. Nevertheless, it is a challenging yet promising way to provide more ideal solutions to achieve the goal of producing achievement-oriented learning communities worldwide. In light of this, it is important to discuss the potential and blended novel approaches in the distance learning platform in order to have an effective teaching-learning environment within a country.

Role of Distance Learning Platform in the Higher Education Sector

Distance learning could be simply termed as a mechanism of providing teaching and learning experiences for its users irrespective of the location where they stay. In other words, geographical separation is no longer a barrier to learning. At present, distance learning is not a novel concept, and the world is gradually adopting its essence, largely due to the aftermath of the pandemic. Hence, distance learning has been coined as a "Panacea" in such times. This redefines the boundaries of education, creating limitless utilities. It has created broader opportunities for both learners and educators in the learning-teaching process. As a result, distance learning plays a prominent role in many institutes in the higher education sector. Due to its popularity, the same is adopted even in kindergarten education in many private institutions around the world, breaking the technical barrier. However, one should clearly understand that mere practice or adoption of distance learning is not forming an ideal teaching-learning environment for its participants. It should be appropriately utilised considering the audience, content, time and context.

Many developing economies have also made vast investments in the recent past to develop distance learning platforms to facilitate teaching-learning. Those are not limited only to physical facilities but also to possible approaches/services for all parties engaged in the learning process. As mentioned, a combination of physical facilities and services compiles the teaching-learning environment. Distance learning requires structured planning, special instructional techniques, well-designed courses and method or modes of communication. Hence, it has more than one aim in the context of higher education. However, it should create an effective teaching-learning environment which produces an achievement-oriented learning community. For this purpose, different tools, techniques and strategies could be used. It mitigates the monotonousness of the education

process and, thus, promotes enthusiasm. Therefore, blended novel approaches are always recommended to adopt.

The distance learning concept has been practised in several institutions over the past years when considering the Sri Lankan higher education sector. Most non-governmental and open universities could be mentioned as some of the best examples that adopted distance learning concepts within their programs. Hence, those institutes are still playing the dominant role in distance learning in the country. During the period from 2003 to 2009, the government of Sri Lanka has greatly invested (Distance Education Modernization Project - DEMP) in the distance learning concept to promote it in educational institutes around the country. The post-secondary education sector was the first audience targeted by these programs. Furthermore, Higher Education for Twenty-first Century (HETC) project enhanced technology-based education in the country[1]. This motivates and stimulates the learning communities around the country to adopt and utilize distance learning platforms for their higher education purposes.

Framework for Effective Distance Learning Experience

Distance learning is a concept of providing continuous education for those who required. However, to reap the maximum benefits from distance learning, it should be properly blended with other related tools, techniques and strategies. Otherwise, the effectiveness of distance learning cannot be guaranteed. Simultaneously, that might discourage or even cause discomfort for both learners and educators. This is why the blended novel approaches are vital and embedded in distance learning. Three components: social presence, cognitive presence and teaching presence, are necessary to build an effective distance learning environment (Figure 1). The level of affiliation and possible overlaps of each component derives the activeness and engagement of the distance learning environment. The so-called "presence" is an important social phenomenon which removes the distance between the learner and the educator. This theory is often coined as "Community of Inquiry"[2]. This enables critical thinking, critical inquiry and discourse among the learning community.

An effective teaching-learning environment promotes interpersonal relationships and enhances communication in a trusting atmosphere. This directly shapes individuals thus, develops appealing personalities. Social presence makes this a reality. On the other hand, cognitive presence can construct meaning through sustained communication among participants. In other words, it reflects the quality and quantity of the participants' critical thinking and problem-solving abilities. The third component, teaching presence, facilitates both social and cognitive presence in a meaningful way to have worthwhile learning outcomes. The absence of any component

makes distance learning more discomfort and, thus, results in an inferior teaching-learning environment. Therefore, prior to implanting novel approaches to have an effective teaching-learning environment, it is mandatory to remember the basics of educational experience.

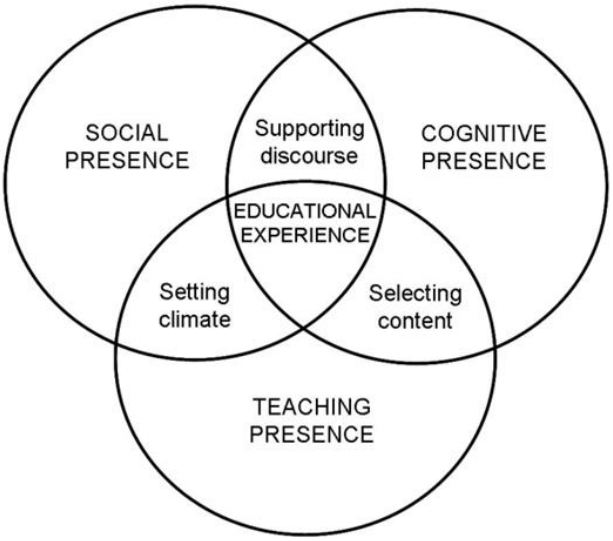

Figure 1: Community of Inquiry Framework[2,3]

Importance of an Integrated Approach for Distance Learning

It is crystal clear that all three components in the Community of Inquiry framework should be fulfilled to obtain the optimum learning outcomes from a distance learning platform. Hence, this is important when designing a distance learning platform in order to enhance the education experience. Further, the suggested approaches should fulfill basic yet vital pedagogical goals. Simultaneously, this approach needs flexibility in adding and removing elements from time to time, focusing on the audience, content, time and context. To incorporate all these aspects, novel approaches should definitely be adopted in the distance learning platform to make it a more suitable teaching-learning environment. Examining the pedagogical objectives may shed some fair insights into suggesting ideal approaches.

Six basic pedagogical objectives are content, social/emotional, dialectic/questioning, evaluation, collaboration/student generated content and reflection (Figure 2). Content is identified as one of the primary drivers and defined as the body of knowledge and information that teachers teach and that students are expected to learn. It could be greatly enhanced through visualization. Learning should support learners socially and emotionally. Comforting and familiarizing with the system is therefore important for all participants. Dialectics and questioning allow to probe students' knowledge

and facilitates refining it furthermore. It facilitates learners to think critically and creatively. Reflection is a powerful pedagogical approach, and the ability to share one's reflections with others can be beneficial. Learners should apply and reflect on what they learnt. Continuous interaction between learner and educator, as well as learners themselves, enriches reflection. Problem-solving abilities in groups are another part of the teaching-learning pedagogy. It is a vital driver of creating knowledge and content. It could also be carried out through peer review and evaluation. Finally, a mechanism for the valuation should be present in an ideal teaching-learning environment to assess students.

Novel Approaches for the Distance Learning

Prior to suggesting blended novel distance learning approaches, it is important to get an idea of current distance learning practices within the higher education sector in Sri Lanka. However, that doesn't mean eliminating those but blending those with novel approaches to make them more effective. Presently, higher education institutes in the country are utilizing many distance learning tools, techniques and strategies. Televisual-based and audio-based techniques such as television, internet protocol television, video conferencing, radio, interactive radio/audio instructions and audio conferencing are some of the pioneering tools and techniques. Simultaneously, multimedia-based tools and techniques such as computer-based education, mobile-based education and also web-based learning systems are introduced recently and rapidly popularized among the learning community. However, when compared with other neighbouring countries like India, Pakistan and Bangladesh, the progress of adopting such techniques and tools in Sri Lanka is moderate. Still, there are many lapses in adopting and introducing such techniques in the higher education system of the country.

Identifying such novel approaches is, therefore, critical in order to generate an effective teaching-learning environment to meet the ultimate goal of education. Furthermore, there are many more potentials and possibilities in introducing and adopting such approaches in the higher education sector. Without understanding the acceptability, accessibility and usability of such tools, techniques and strategies might create an environment which would be uncomfortable for both learners and educators. Therefore, proper understanding is necessary since online pedagogy should have the characteristics of accessibility, affordability and flexibility for its users. Correspondingly, it should be a workable mechanism for all audiences which receive and engage in higher education in the country. Cost-effectiveness is another paramount criterion that should be considered. These aspects facilitate both educators and learners to engage in the teaching-learning process from anywhere, anytime, in any rhythm and by any means.

"Computer-Aided Instruction" (CAI) is one such approach that could be adopted in the distance learning platform. This is a field where most higher education institutes in the country could easily practice. CAI acts as a digital tutor and facilitates the self-learning skills of the participants with user-friendly and precise instructions. CAI meets the diverse needs and characteristics of mature learners by providing opportunities for self-paced learning that can be both individual and group-based. It could be best utilized to develop content-specific skills (math, science and reading) since it comprises of tutoring component. Further, interactive texts and images facilitate learners with more detailed analysis and explanation of theories and models. The instant feedback mechanism of CAI provides more user attractiveness. It makes interaction with content more stimulating, engaging and enjoyable. A similar variation of CAI is "Intelligent Tutoring System" (ITS). It is also a digital learning environment which includes computational models in cognitive science, computational linguistics, artificial intelligence (AI) and mathematics[2]. This aids and develops problem-solving ability that the learner is expected to master by deploying a cognitive model. Recent studies on ITS proved that it is more successful and precise than a human tutor.

"Digital Learning Games" is another attractive and interactive technique to motivate participants to engage in distance learning education. It has an explicit educational focus. This allows learners to participate in the virtual world in which learner plays a dominant role in solving some problems systematically. It enhances critical thinking, inquiring and problem framing. Digital Learning Games are highly platform independent and can be created on multiple platforms. Participants could be able to engage in digital learning games via both station and portable digital devices. It provides a novel experience to its users. The next level of digital learning games is the motion-based virtual realities. The Digital learning game environment highly depends on focus, dimensions, scale, content and much more. Hence, varied genres (strategy, re-enactment, quiz, fantasy/role-playing, action/adventure, alternative reality, sports and simulation) of digital learning games are available. Most importantly, this environment provides learners with different scenarios to apply what they've learnt. Furthermore, digital learning games can be categorized into three groups: short games that last for a few minutes using online or hand-held devises; fixed duration with assigned start time and an end time; and ongoing participation games in which a learner engages routinely. Another prominent advantage of this technique is that there are no limitations on the development and engagement of the content.

"Widgets" are another novel approach to enhancing distance learning. It is a stand-alone multimedia tool for education. Widgets are not fully developed applications (apps), and those are relatively smaller web-delivered modules of content which could be easily added to any digital

platform like the web or social media. Therefore, it is also termed as mini-applications. The interface of widgets facilitates learners to add or remove content from time to time. It is also somewhat similar to blogs and wikis. The best example for widgets is South Korea's EDUNET learning portal[4]. It is a networked application for group study. A Learning Management System (LMS) may have multiple widgets.

One advanced type of distance learning approach is the "Immersive Environment"[3]. It allows participants to become totally immersed in a self-contained artificial or simulated environment while experiencing it as real. It enables rich and complex content-based learning. This greatly enhances learners' technical, creative and problem-solving skills. Many developed countries are currently practising such techniques to offer learners a highly engaged teaching-learning environment. Multi-user virtual environment (MUVE) and virtual/augmented realities are the most prominent techniques categorized under immersive environment. It delivers a real-time learning experience for the learners. Harvard University has conducted various research activities related to MUVE and even conducted sessions for its students. On the other hand, there are some negative points as well when using such technologies in developing countries. The major constraint is that those technologies are highly capital intensive. Simultaneously, both parties require solid technical know-how to handle, develop and maintain such content.

Another novel concept is the virtual higher education institutes which have a fully online teaching-learning environment. These are also coined as cyber institutes. This is entirely opposite to traditional brick-and-mortar institutes. Most prominently, fully developed applications are used to deliver knowledge to learners. Those are very user-friendly digital applications. Prior to initiating the learning process, the users must familiarize themselves with the platform in order to get the maximum out of it. Utilizing multiple and diverse ranges of online tools and appliances is key to enhancing the educational experience of the user. It provides synchronous and cohort-based instructions to the user. This facilitates substantial opportunities for online communication with peers and the faculty. These institutes are very much popular in the USA.

Apart from the technological tools and techniques, strategies such as online coaching and mentoring are also required to generate an effective teaching-learning environment for its stakeholders. It is a critical determinant of student retention and career development. A participant who engages in distance learning education may feel discomfort and stress from time to time, like in traditional education. Therefore, there should be a proper and ideal mechanism to mitigate such circumstances. Unlike physical sessions, online sessions allow participants to conduct them more frequently with a wider audience and cost-effectively. Even in some cases, some institutes use Artificial Intelligence (AI) to conduct routine coaching and mentoring

sessions, which is very popular in higher education. Also, this allows participants to carry out self-assessment and self-awareness.

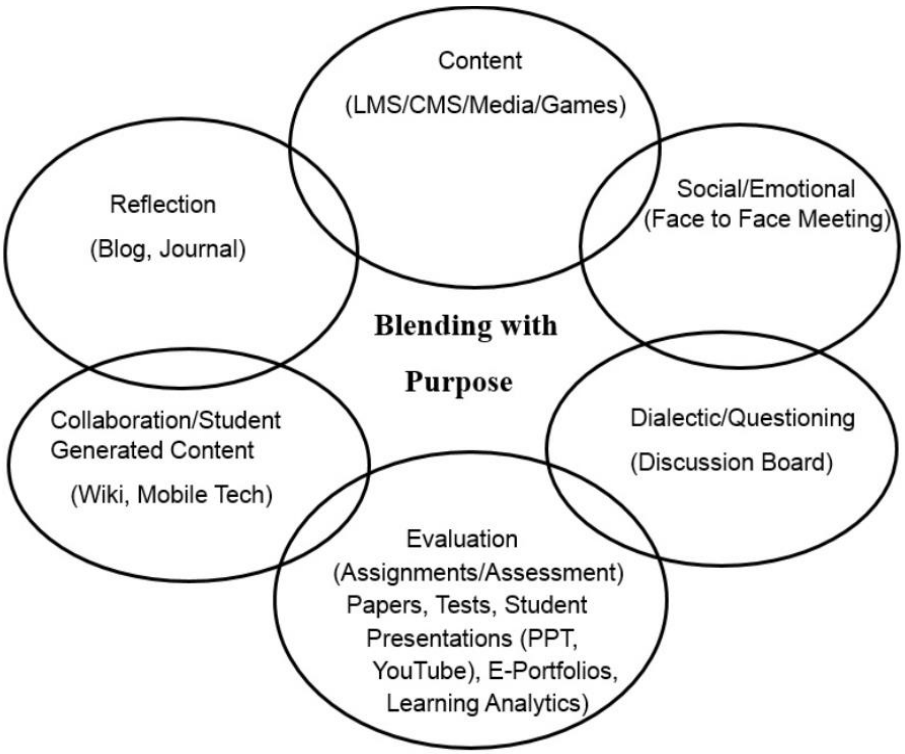

Figure 2: Main Pedagogical Objectives to Fulfil Distance Education

Final Remarks

In conclusion, novel distance learning approaches create an effective teaching-learning environment which produces an achievement-oriented learning community. These approaches should allow room for interactivity, flexibility, customizability, multiple formats, connected learning and development. The best way to inculcate such approaches is to have viable partnerships and mutual understanding with regional countries and also with other developed economies. Furthermore, in-house development of contents and localization is necessary when adopting novel approaches. Simultaneously, forming partnerships with local bodies is of utmost importance to developing distance learning in the country. Both public, as well as private parties, should take part in this process. Making available "Open Educational Resources" (OERs) is another aspect of distance learning. It facilitates free to use, distribution, re-use and adaptation. This makes the distance learning environment more influential. More importantly, technology awareness should be there for both learners and educators regarding these tools, techniques and strategies. Ultimately this creates an

effective teaching-learning environment to enable achievement-oriented learning communities in the higher education sector.

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CHAPTER 17

Virtual Reality: A Better Learning Environment to Upgrade Distance Learning

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Distance learning has increased in the past several years in the world due to the turbulent environment arising from the COVID-19 pandemic. Information and communication technology provides the basis for distance learning; thereby, the students can interact with the teacher/students and conduct a virtual learning environment (VLE) or study from home without being physically seated in a classroom. VLE facilitates a teaching-learning environment with assessments, activities, and interactions within the course structure. The VLE reduces the cost and allows communication, and distribution of reading materials, tracking tools, and chats via the internet[1]. Therefore, these functions of VLE can be utilized in the teaching-learning procedure to spur learners' achievements further.

Virtual Reality (VR)

VR is an example of emerging technology that is considered to be novel, has rapid development, and has effects on human existence[2]. The concept of VR originated in 1950 and gained popularity in the 1980s and 1990s[3]. In VR, users can directly interact with an artificially generated environment, which facilitates an innovative form of interaction between a computer system and a human[4]. VR can encompass programs that might be surely regarded on a flat display screen, along with a desktop monitor or pill tool, in addition to those that require the usage of "goggles" and different

head-mounted devices. An immersive experience involving a sense of presence in a digital environment, VR involves users immersing themselves in a digital environment. Three main characteristics are interconnected with each other in VR and so-called the "virtual reality technology triangle"[5] (Fig. 1). These characteristics are:

- Imagination: The feeling of being in the unlimited imagination space given by the VLE. This is referred to as a "feeling of presence" in the computer-created world.
- Immersion: The user feels wholly immersed in a virtual environment. The feeling is gained via the quality of display devices and the software. Visual, acoustic, and tactile immersion surround the user in the virtual world.
- Interaction: The users interact with the virtual objects without only seeing, hearing, or feeling the virtual objects. It includes the actions required in physical reality, such as grabbing an object, moving a hand, etc. The operator can use a mouse or keyboard or press a button in this process.

Proper collaboration of imagination, immersion, and interaction is essential in all the designs of virtual worlds. The technology of VR can be classified into two as follows:

1. Low-immersion VR: A computer-interface technique that generates three-dimensional virtual space viewed through a two-dimensional monitor and a desktop computer
2. High-immersion VR: Using a head-mounted device, which enables to experience a 360-degree virtual space that is perceived to be spatially realistic

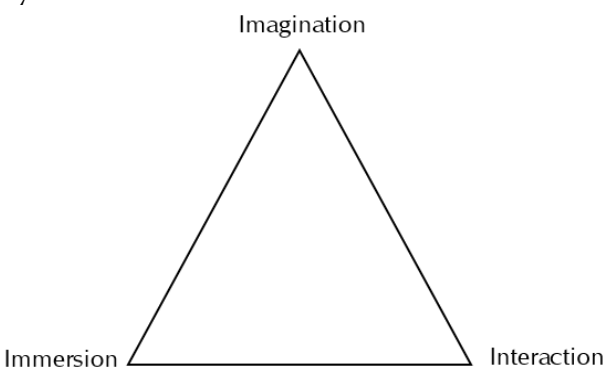

Figure 1: VR Technology Triangle

VR in Education

The information and communications technology (ICT) revolution is not new to the education sector, which is experiencing an unstoppable digital transformation today. The teachers/institutes must keep up with novel

technologies for the effectiveness of teaching, which improve students' performances, especially in distance learning. VR is a novel technology that can incur a dramatic impact on distance learning while facilitating online students with relevant skills and knowledge[6]. Learning from experiences is the basis of constructivism, which states that humans acquire knowledge with the experience gained through life. Therefore, VR supports a constructivist tactic for education[7]. In addition, the new technology can be used to improve collaborative learning in the classroom.

Recently, teachers have used VR in the teaching process of varied disciplines. However, VR is not equally suitable for all subject areas and matches better for subjects that need visualization for a better understanding. However, VR is effective in disciplines such as biomedical science, medicine, engineering, physics, and chemistry.

VR makes learning fun and enhances students' satisfaction, motivation, and attention. Students can assimilate concepts and comprehend concepts better when VR is used. Interestingly, the students can explore the things which are impossible in the real world, such as travelling inside the body, exploring planets, visiting faraway places, etc[8]. VR can be used in higher education as follows:

Online Classes

With the emergence of the COVID-19 pandemic, online education has become very popular since 2019. The students can continue their college/school education online or otherwise, they can register for the courses even in other countries. The use of VR provides interest in online-based learning. Teachers can monitor their students' cognitive habits and instructional methods by documenting and revising classroom sessions. VR can fulfill the gap between theoretical knowledge and its practice. Learning the theory using a 3D environment gives the student a memorable learning experience. Moreover, this will enhance student engagement in the class and provides a safe learning environment.

VR Field Trips

With the development of technology, students can now attend virtual field trips. Students at some well-known universities around the world can stay at home and go on virtual field trips. Rather than looking at a picture or a video, VR field trips can make learning more exciting and empower the students who are inactive economically or physically. VR field trips can be classified into two, and in one type, the students only can see and, listen. In the other type, the students can virtually participate in activities in the field/laboratory safely and comfortably[9]. In addition, VR field trips can be designed as games and can perform regardless of time, weather, or physical strength. The advantages of virtual field trips are;

- All the students can join without any physical struggle
- Students can revisit the field visit and access information when needed
- Students can familiarize the field before going there in-person

VR in Arts Education

This allows the students to see famous art galleries or paintings worldwide while at home. VR allows the student to make use of virtual 3D objects and models over inventive systems through digital software technology. Using VR as a didactic and educational tool, students can benefit from the digital world that surrounds them outside the classroom.

VR Laboratories

Practical experience is essential in the education system. In distance learning, it is challenging to experience a laboratory facility while getting instructions from another location. The virtual laboratory concept creates a teaching-learning environment to develop the laboratory skills of the students. The advantages of virtual laboratories are[10,11];

- Improve the inspiration for learning
- In laboratories, ample space is occupied for the equipment and machinery. Virtual laboratories reduce the amount of space occupied by large laboratory equipment
- Allow access to expensive/unaffordable machinery
- Students can repeat the experiments without worrying about the expenses/ availability of the chemicals
- Encourage students' active participation
- This enables the instructor to work with large groups of students because each student can view the instructor's explanation at their own pace and with the highest level of detail
- Reduce the damage to the machinery that occurs by misusing
- Reduce the hazards of chemical reactions
- Can illustrate features more accurately than doing it in physical
- Can teach dangerous/ expensive/complicated experiments
- Facilitate the students to have a real laboratory experience from a great distance
- Facilitates addressing a large audience without considering the available laboratory facilities

Even though VR best matches in the virtual laboratory, there are several shortcomings[12]:

- Discourage the use of real instruments or devices
- Distract group works and communication

- Plagiarism can be higher in the examinations/assignments
- Issues in functionality

VR for Medical Students

Usually, non-human or non-living models are used in medical institutes to teach and train medical students. However, the simulation-oriented curriculum is very effective in teaching medical students. VR is a novel technology being used in the medical field and applicable to different diseases of the body. Professionals and students in various clinical sciences can assess their readiness to provide clinical treatment based on this technology before performing any treatment on a patient. In order to train medical groups effectively, designing virtual reality tools could be a fitting solution. According to Samadbeik et al., 2018, involving VR technology in surgery training has shown higher accuracy in medical practices[13]. VR facilitates economical training of clinical practices, and the practices are repeatable and standardized.

VR for Language Learning

There are several methods of learning a language such as reading books, watching movies, etc. VR-based tools are developed to learn languages, and students can practice speaking via this platform. Developed programs like ImmerseMe offer better language learning experiences. This could be a better way for students who are poor in English to improve their language skills in order to follow their courses in English.

Train Teachers for VR

A large-scale survey of teachers' opinions on using VR in the classroom revealed positive perceptions among teachers to use VR in education[14]. The survey results discovered a positive association between the degree of VR integration and the frequency of VR use. However, training the teachers is needed to develop and practice their skills in designing VR-based lessons.

VR as an Active Learning Tool

Traditional teaching methods are teacher-centered and mainly focus on recitation and memorization. In conventional teaching, the teacher plays a significant role and does not emphasize developing the students' ability to solve problems, think critically, and make decisions. However, modern teaching methods focus on student-centered learning and a teaching environment. The students are encouraged to engage in the learning activities rather than passively participate. In a VR learning system, students direct their own learning under the guidance of a teacher.

VR is one of the novel technologies used in the teaching-learning process, which is highly interactive and provides a technology platform for presenting lifelike experiences to users. The learning system in VR is the Tactus Immersive Learning Environment (TILE) which focuses on learning systems beyond the economic barriers of the school or the learning institute[15]. The economic barriers affect the schools from establishing laboratories or going on field visits, and in due course, the TILE system can utilize the available projectors and computers in the school to uplift students' achievements via VR.

Recent research publications reveal a higher degree of engagement and satisfaction in VR-engaged education systems. This further enhances the student's self-confidence and promotes engagement in learning. VR has shown a higher reactive learner's role in learning experiences. Immersive VR experiences in VLE have the potential to facilitate cognitive knowledge dimensions and cognitive process dimensions in students.

How VR Addresses Bloom's Taxonomy

Bloom's Taxonomy, also known as the Taxonomy of educational objectives is applied worldwide in teaching. Bloom's Taxonomy was slightly revised by Bloom's former students L. W. Anderson and D. R. Krathwohl and named "Bloom's Revisited Taxonomy"[16]. Bloom's revisited taxonomy (Figure 2) declared in 2021 uses verbs instead of the nouns used in each category in Bloom's Taxonomy. This presents a hierarchy of learning from the simplest to the most complex and consists of cognitive processes.

Traditional teaching-learning systems mainly focus on the bottom three stages of Bloom's Revisited Taxonomy: remembering, understanding, and applying. The VR-based teaching-learning system is far forward in gaining higher skill levels of Bloom's Revisited Taxonomy (analyzing, evaluation, and creating) compared to other teaching-learning systems[17].

Development of VR-based Education

Technology is changing rapidly. Therefore, the developers of VR education systems should plan for at least the next two years when designing the lessons. There is a possibility to change the VR hardware and software, and therefore, it is essential to begin with the most sophisticated tools/equipment to cope with the changes. It is important to consider the audience's available equipment to use VR. The program should start with a simple framework that is easy to understand and facilitates a general feel to the user. Thus, preparing the instructions in a way that can be understood well is recommended. It should be noted that VR could be developed to facilitate the students to understand the materials provided in their handouts well[18].

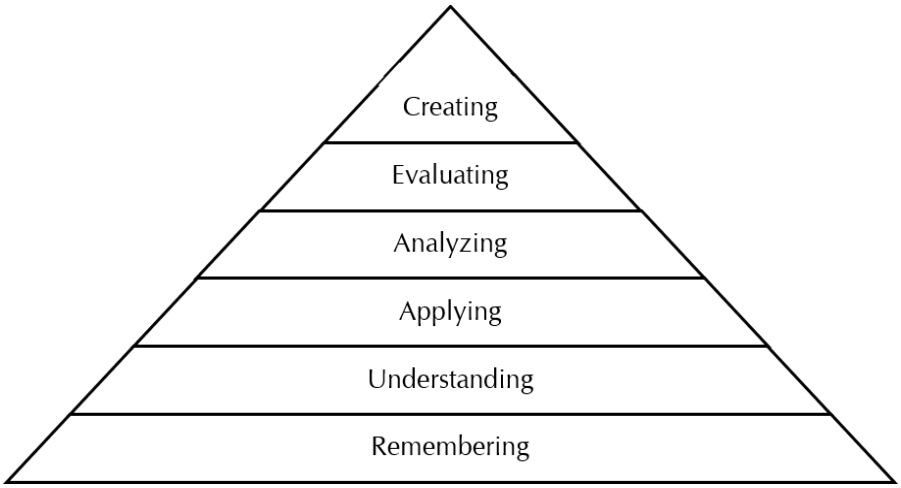

Figure 2: Bloom's Revisited Taxonomy

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CHAPTER 18

Determinants of Quality of Online Education: Special Reference to the Higher Education Institutes in Sri Lanka

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Introduction

Due to the COVID-19 pandemic, the education system in Sri Lankan Higher Educational Institutes has changed severely. The education system has been disproportionately impacted negatively as a result of this epidemic. As a direct consequence, the vast majority of students have been obliged to skip class. By April 2020, the virus had a detrimental effect on 90% of kids all around the world[1]. Online Education has shown to be a lifesaver for students seeking to further their education while working, and it is typically the greatest option for those students who prefer to further their education while maintaining employment.

While facing the pandemic situation in the country, Higher Educational Institutes need to maintain the quality of education through online methods. Though it is challenging, quality education is perilous to achieving sustainable development in a country. Quality education is critical for long-term recovery and development in light of COVID-19 and the current economic crisis the country is experiencing.

An investigation accompanied by the Asian Development Bank revealed that approximately 90% of Sri Lankan student respondents have access to online education[2]. A sophisticated nation like Japan has the same online education employment rate as Sri Lanka. With the support of the Lanka Education and Research Network (LEARN), online academic

activities were developed. Every ISP has made Zoom available for free to every university and state Higher Educational institution via LEARN, facilitating the epidemic[3]. For online classrooms, the majority of universities in Sri Lanka favour Zoom over Cisco Webex, Google Meet, and Microsoft Teams due to its ease of use.

While maintaining a social distance, online education modes enable students to communicate with their lecturers and fellow students. Online education makes use of both synchronous and asynchronous means of delivering information via the Internet. Students can use online education to learn, interact, share ideas, be self-directed, and use their time in the most effective way for them. Online education necessitates developing and maintaining sound social interactions between students and lecturers who are competent in using technology. Other factors that influence online education include the availability of adequate facilities or infrastructure, as well as a student's financial situation.

The ease of use and availability of timely support from lecturers and educational institutions, as well as motivation and some other factors, determine the quality of online education. Different students may view these variables differently. Many students face various challenges that hinder the smooth flow of academic programmes. Students in areas with poor internet service and frequent power failures often have a lower quality of online education than others.Online education has the most considerable influence on students since they are the ones doing education. In addition, lecturers play a crucial part in online education. They must design educational materials and presentations that are consistent with the online environment and are based on facts and data. Furthermore, online educational facilities cannot be provided without the university administration's assistance. Multiple possessions are essential for the efficient online transmission of educational materials and the education process itself. Restrictions caused by the COVID-19 epidemic have led to the implementation of online teaching and education in the majority of underdeveloped countries. However, difficulties such as limited Internet connection, unpredictable electricity failures, and the absence of family and university support may have hindered the students' education experience.

Support Given by the University and the Quality of Online Education

The university support is included the availability of counselling and advising services for university students. These consist of online education orientations, administrative support, and social engagement with users. University support is when students require assistance with entrance, registration, scholarships, research, and student life-related matters. Furthermore, the addition of library services, a help desk, computer labs, and amenities also can be identified.

Supporting students throughout the educational process is essential for enhancing their educational experience. Throughout the COVID-19 pandemic, the majority of universities began offering online courses. The majority of university chief academic officers (58%) believed that online education was essential for continuing education activities and viewed it as an integral component of the overall organizational strategy[3] The university's primary responsibility is to improve educational delivery methods and provide a dependable source. Providing lecturers with the essential knowledge, skills, and abilities facilitated the conveyance of quality education.

Even during difficult times, the assistance provided to students allows them to maintain their motivation to learn. Student support is essential for assisting students in attaining their educational objectives. Universities must offer students a pleasant environment for learning. It is likely that students' educational experiences will be enhanced by support strategies that are adapted to their needs and learning styles[4].

Support Given by Lecturers and the Quality of Online Education

Lecturers have a substantial effect on the quality of online. They are the impetus behind providing high-quality education. They can be identified as motivators, guides, and mentors who assist students in resolving their problems and navigating all situations. They serve as role models and inspire learners to look at things from different perspectives. They also contribute to reducing academic dishonesty, which enhances the academic performance of students[5].

In online education, they assist in resolving communication problems, offer comprehensive clarifications to avoid misunderstanding, record their lectures, and provide additional materials to students to enhance their education[6]. Throughout the COVID-19 pandemic, the economic recession, and job security concerns compelled educators to exert their utmost effort, resulting in an overall improvement in education quality. Universities have been found to have a significant impact on the attrition of students taking online courses. This is especially true in cases where teachers have a negative attitude toward online education[8]. According to my view, one of the most significant obstacles to the widespread adoption of online courses is the reluctance of educators to participate in online instruction.

Even lecturers who were adapted to using technology in the classroom were wary of online formats. They expressed concern about decreased human interaction, technological failures, students' varying technological proficiency, and increased university workload. Lecturer expertise and involvement are directly related to educational quality. Lecturers can be effective when they are approachable, passionate, student-

oriented, qualified, and expert. Lecturers may be unable to meet all these criteria while using online modes, causing students' education to suffer. The teacher-student relationship is critical in shaping students' educational experiences and expectations. The better the outcome, the stronger the bond.

Support of Motivational Factors and Quality of Online Education

The factors that encourage students to positively evaluate their online learning experience are the ones investigated in this study as motivational factors. Throughout the educational process, motivation is crucial. Learners are inspired to develop their skills when education is connected to rewards like grades, etc. The learner's motivation and life circumstances were the most effective motivators for pursuing an online education.

Support of Other Factors and Quality of Online Education

Without practical experience, people are more likely to make errors, waste time, and exert effort. They are more likely to have disagreements with technology, which could cause stress to develop and lower the standard of online education. There are fewer opportunities for students to receive hands-on training in the online environment because lecturers deliver the material orally or by recording their lectures.

The lack of practical experience could harm the quality of online education. One-to-one interaction occurs naturally in the teaching space when students converse with one another, listen to each other's opinions, and ask questions. Students are less likely to share resources and work together to solve problems when they have little or no interaction. One-to-one communication fills this gap, enabling students to benefit from a higher level of education through superior resource sharing. However, interactions between students are scarce in an online learning setting. Discussion boards and breakout spaces in the LMS may offer some opportunities for this kind of interaction, but they are incredibly scarce in developing nations.

Strengths of Online Education

Online courses are popular as distance learning in higher education. The e-environment provides people with little access to education, unprecedented opportunities and a new paradigm for educators that enables the development of high-quality, dynamic courses. Some of the most significant advantages of taking part in online programs are as follows:

The main benefit of asynchronous online education is that it makes it possible for students to participate in top-notch educational settings even when their schedules conflict with others or they are too far away to attend classes in person. Given that they have access to a computer and the Internet,

students from any country can participate in the lessons. Additionally, the online format gives lecturers and students with physical disabilities more flexibility in participating in class.

The Virtual Classroom is accessible 24 hours, seven days a week. The ability to save time is another advantage of the online education model. Using asynchronous communication through Internet conferencing tools, a professional juggling work, family, and academic responsibilities can take part in the online class. There is no question that the work needs to be finished; just complete it when it is more convenient. The classrooms are open to the students seven days a week, throughout the entire day, each and every day. In addition to this, they are always able to gain access to the readings, lectures, and class discussions that are taking place in the classroom. People who might want to reread a lecture or take a little extra time to think about something before moving on will find this feature especially helpful.

The online approach permits energetic interaction between the lecturer and students. Through the exchange of resources and ideas, the educational process will foster ongoing synergy. Each student is permitted to participate in class discussions and provide feedback on the work of other students. The most distinguishing and essential feature of the online education format is the synergy of the student-centred Virtual Classroom.

Before responding or moving on to the next topic, the learner has the opportunity to reflect on what others have said in an asynchronous online discussion. This structure allows students to respond with significantly more depth and thought than they would in a traditional face-to-face discussion, in which they would have to analyze someone else's comment on the spot and respond immediately or lose the chance to participate.

Each student responds both to course materials (lectures and textbooks) and to what other students say in an online discussion. Typically, students respond to the portions of a larger conversation that address their interests most directly. When these occurrences occur, people simultaneously converse in smaller groups. Students should read everything their classmates say, but should only contribute to the conversation in areas that interest them. Therefore, students are in charge of their education and can tailor class discussions to their individual needs. Students should be able to contribute to the course in a manner that is unique to them and take away a mixture of useful information that is unique to them.

There is a degree of anonymity for students in the virtual setting. The majority of discriminatory factors, such as age, clothing, physical appearance, disabilities, race, and gender, etc. are absent. Instead, the emphasis is clearly on the topic of the discussion and the person's ability to reply and contribute in a meaningful and knowledgeable manner to the issue at hand.

Innovative and inventive training methods are even more crucial given the Virtual Classroom's reality's semiautonomous and self-directed nature. The professor and student work together to create a dynamic learning environment in an online context. There is hope that those who adopt this new educational paradigm would also give up bad habits because of the reality of a technological revolution. Course objectives and teaching strategies must be taken into account as educators adapt their courses to fully utilize the online format. Many qualities that make a great online instructor also work wonders in a traditional classroom situation.

Weaknesses of Online Education

Even though online learning has numerous benefits, there are also several drawbacks. Students must be able to access the online platform. Ineligible students will not be able to enroll in the course due to lack of access, whether due to logistical or financial issues. For both instructors and students to succeed in an online setting, they need to be computer literate. They won't be able to succeed in an online program if they lack certain technological resources. The failure of one student or professor will result in the failure of the entire program.

Reliable and easy technology is essential for an online program to succeed. Technology is used as an instructional tool and is meant to be inconspicuous when it works well. However, errors can happen anywhere in the system. For instance, the institution hosting the link could experience an overload of people, which would cause it to slow down or fail, or the server hosting the program could collapse, which would result in the Internet connection failing.

Online education can be a highly successful alternative educational medium for responsible, mature students. For students who are more dependent, it is improper. However, the student's level of accountability is increased. Students must be extremely organized, self-motivated, and time-management masters to keep up with the pace of an online school. For these reasons, younger students (i.e., those in elementary or secondary school) and other dependent learners who struggle to meet the online paradigm's standards should not participate in online education.

While offline success often predicts online achievement, this is not always the case. If professors aren't well-versed in online teaching, the quality of the program as a whole will suffer. The professor should have strong English language skills in both writing and speaking. A quality online program cannot succeed if its instructors are not well-versed in using the Virtual Classroom. A lecturer must be able to compensate for a loss of physical presence in the virtual classroom by creating a welcoming environment in which all students feel comfortable contributing and are especially aware that their professor is approachable. If this is not done, the class may become estranged from both the teacher and one another.

Since they are mainly concerned with the bottom line and perceive online programs as a means to raise revenues, the administration may not always be devoted to viewing them as a means to give high-quality education to those who would not otherwise have access to it. The most exciting possibility for online education is the high synergy represented by participant interaction in larger classrooms (20 or more students), however, the amount of synergy begins to shift along the educational spectrum, finally changing to individual study to deal with the large class. There is currently little interaction and discussion between participants and the lecturer. The medium's full potential is being underutilized.

Regardless of the present enthusiasm for online programs, many courses are not matching online since the electronic intermediate does not permit the most effective technique of education. Here are a couple of such examples: Physical movement and practice can help students reach their educational goals in disciplines such as public speaking, surgery, dental hygiene, and athletics. These topics are more suitable to teach in a typical classroom setting. Hybrid courses may offer a short-term resolution to this problem by making this section of the course more accessible to students who would otherwise be unable to go to campus. However, these strategies show that online education cannot suit all educational needs and goals. The ability to imitate a physical education experience technologically does not mean that this is the optimal form of training.

Summary

Due to the pandemic situation in Sri Lanka, the Higher Educational Institutes have been changed severely. Until the pandemic, physical education was offered in Sri Lanka, and it has been transferred to fully online after the year 2020. While engaging with online education, institutes had to maintain the quality of the education. Accordingly, there are three main factors identified by this paper as the determinants of the quality of education; support given by the university, support given by lecturers, support of motivational factors and other factors. Furthermore, there are both advantages and disadvantages of online education.

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CHAPTER 19

Understanding Students' Performance through Online Teaching to Motivate Students

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Introduction

Each undergraduate's aim is to be a good citizen and to serve society. To achieve this aim, the lecturer's responsibility towards the university undergraduates is massive.

One of the important things that university academics should excel at is, understanding the skill level of his/her students. This is needed to set reasonable assessments to grade the students, to get to know what to teach and what not to teach, to deliver a lecture effectively and efficiently, for time management, etc. It is also useful to praise the students for their good work and encourage students to do their best.

Back in the day, when there was no online teaching, understanding the skill level was easy and possible. Students were given tutorial questions or practice questions and the lecturer had the freedom to roam around the lecture hall and see how his/her students answer the questions given. Moreover, when it comes to physical delivery, an experienced lecturer can even notice students' facial expressions, body language, etc., and get instant feedback.

Unfortunately, the universities were forced to pause physical deliveries because the Covid-19 pandemic was spreading around the world speedy in early 2020. Afterwards, almost all higher education institutes started online delivery methods instead of physical delivery.

As discussed earlier, understanding the student's level, and rewarding them accordingly is crucial in higher education. However, engaging in this task online means very challenging. This paper's main aim is to discuss how to examine students through online techniques and encourage them to achieve their goals.

Measuring Student Performance

An academic should be aware of how to measure a student's performance. Concentrating on one area and measuring a student's skills can bungle his/her interest in the subject. Following are some areas that need to concentrate on, when measuring student's performance.

Providing Correct Answers to Assessments

This is one of the most important factors that need to consider when measuring student's performance[1]. No matter how hard academics put effort into teaching, if the students produce wrong answers, the teaching has no value in it. The assessments can be quizzes, writing reports, mid/end semester examinations etc. The assessment is a good method to understand student's capabilities on the subject matter.

Time Taken to Answer a Question

Even though the answers to the questions are correct, taking a very long time to answer the questions can reflect some negativity of student's performance. This can happen due to several reasons. The lack of expected knowledge in the subject area, discontinuous learning behavior, thinking patterns, lack of theoretical or practical knowledge of the subject are some reasons behind this[2].

This can be overcome by interacting with students. The lecturer can ask students to explain their answer to a particular question, perform viva or encourage students to discuss their answers among themselves.

Effective Listening

This is very important before engaging in an action. Sometimes, there may be situations where a student expresses something else although he was asked to explain a different scenario. According to the results of some studies, it is stated that students drift away after 10-12 minutes from the start of the lecture (Figure 1)[3,4]. So, it is the lecturer's responsibility to keep the students' attention on the lecture.

Group Work Skills

Even though some students are good at individual work, they may not be able to do group work. This can affect them severely when they are

in the industry since nowadays the departments are working as teams. Introducing teamwork in the schedule, the student can be introduced to a group of fellow students so that he/she can get the experience.

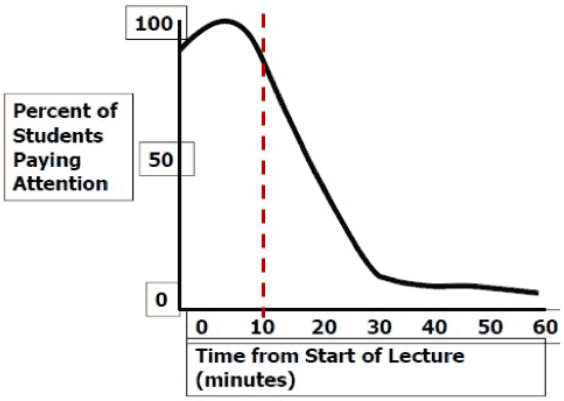

Figure 1: Percent of Students Paying Attention vs. Time

Student's Thinking Pattern

Sometimes student's thinking pattern is also a direct factor in his/her performance. Most of the time, this can be seen in technical subject areas. Some students present solutions to problems that outbound conventional methods. Hence, academics should concentrate on not only the final result, but also the steps which a student has followed (basically reflects his/her thinking pattern) and spur the student where needed[5].

Quick Assessments

It is not desirable to wait until the mid-semester or semester end to measure student performance. An academic should adjust his/her content, delivery method, and speed of the lectures according to the student's feedback.

One of the best ways to perform this task is by getting student feedback from quick assessment[6]. Even a simple yes/no type of question within a lecture can improve the understanding of student's level and reward him/her accordingly.

Until now, the discussion was based on the methods of identifying student's performance. The rest of this paper is dedicated to introduce some solutions to motivate student's achievements in each case through online teaching.

Motivating Students to Providing Correct Answers

Compared to on-campus methods of acquiring answers to assessments, online methods should be examined carefully. Since lots of

students tend to cheat, their real performance is difficult to measure. Hence, it is difficult to guide them to do their best and filter out their real achievements.

When it comes to online MCQ-based examinations, academics can form some additional questions and use LMS (Learning Management System) to select a random set of questions for each student. Providing a quick grade afterwards can boost student's enthusiasm for the subject. If it is an online structured essay/ essay examination, supervision should be made through camera/ cameras. This can be used to get fair judgements on each student and automatically encourages them to achieve more because of the reliability of the system.

Motivate the "Fastest Man"

One of the difficulties lecturers and students face in online teaching is that submitting answers within time. If it is a practice question, and the lecturer wants to submit student's answers, he/she can use an online teaching platform (E.g., Zoom, MS Teams…etc.) together with a mobile app which can send answers as text and photos (E.g., WhatsApp, Viber, Messenger…etc.). This is very useful for acquiring answers which cannot be expressed in words (E.g., graphs, block diagrams, circuits, figures, etc.). Apart from that, time constraints in LMS and upload deadlines to cloud platforms can be used to reward quick students.

Spurring the Best Listener

Most of the students tend to do some other work that are not relevant to the contents during online lectures. To get the best out of the students, a lecturer needs to adopt appropriate strategies to make the delivered content more interestingly. Adding videos to the online lecture, asking yes/no questions (E.g., by using the raise hand option in Zoom), letting students express their opinion (E.g., answering questions through texting) are some methods to boost effective listening.

Online Group Work as a Life Skill

One disadvantage of online teaching is that the students can't interact with their colleagues more effectively. This degrades their enthusiasm for the subject area. At least letting them work in groups through online means can hold them from fading away his/her interest. Discussing with peers in the group will also enhance the understanding of the subject area[7].

By forming small groups (E.g., breakout rooms in Zoom), a lecturer can facilitate students to work in teams. At the end of the session, the lecturer can ask students to present a summary of their discussion. Students should

have the ability to use online presentation tools (E.g., Google docs.) to work together. Moreover, shared whiteboard, and share screen options are useful in these situations.

Locating the Non-Conventional Thinker

A lecturer can spur his/ her students by accessing their thinking patterns. This can be done online by using several methods. The easiest method is by directly questioning the student. If it is a written assignment, this can be realized after going through the assignment and giving feedback in the next lecture. For submitting the assignments, LMS can be used. To check the step-by-step process, several online tools can be used.

When it comes to circuit simulation or engineering drawings, online modeling, and simulation programs like Tinkercad (Figure 2) are possible. Online AutoCAD is also available for engineering drawing. Online compilers are available for computer programming. A lecturer can ask to send student's work-in-progress and motivate them. Moreover, audience engagement platforms like Mentimeter can be used if it is a simple question to be asked from the students and locate non-conventional thinkers.

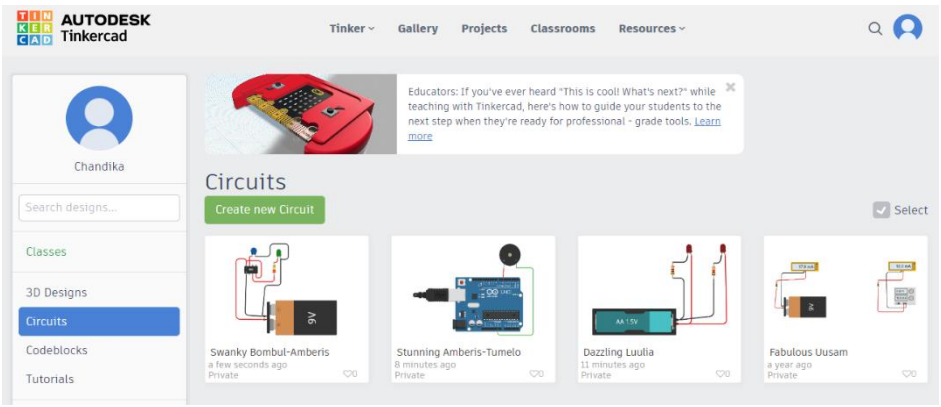

Figure 2: Tinkercad – An Online Modeling and Simulation Platform

Spur Students Using Quick Assessments – Online Solutions

As explained earlier, it is difficult to observe the students' facial expressions, and body language and judge whether they understood the delivered content by online means. Hence it is good to have quick assessments. This not only boosts students' enthusiasm in the subject area since they tend to believe they know something, but also the lecturer can adopt his/her plans towards students on the subject matter accordingly. However, it should be quick. This can be achieved mostly through by asking yes/no questions (answers can be acquired through virtual raise hand options using online teaching platforms), MCQ questions through quick surveys (E.g., using

online survey tools like SurveyMonkey) and quick questions through game-based online platforms in a more interactive manner (E.g., Kahoot! – Figure 3)[8,9].

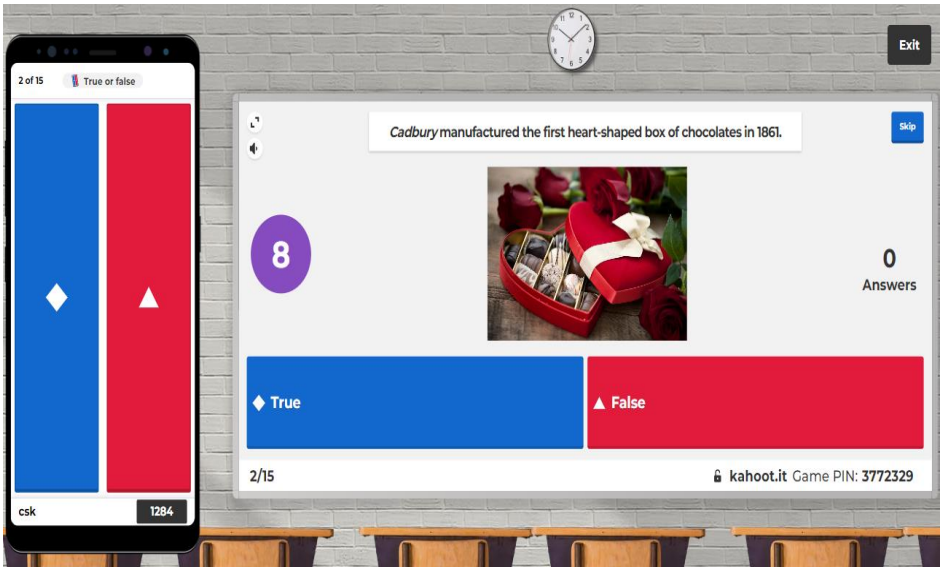

Figure 3: Kahoot! – A Game-Based Online Learning Platform

Step Forward

Apart from discussed methods, there are some other ways to motivate students after assessing their performance. Some students lack in their analytical skills more than practical skills. It is better to sharpen their practical skills by facilitating a practical environment by introducing reliable online retail services to purchase needed equipment for their experiments (E.g., AliExpress, eBay, etc.). Students who are good at analytical skills, programming skills, etc. should be directed to online simulation tools to encourage them to do more[10]. Students who like to be freelancers need to be introduced to reliable online freelancing websites (E.g., Fiverr, Upwork, etc.). These practices not only spur students' interest in their respective subject area but also strengthens their abilities to secure better carrier opportunities.

Summary

This paper presented novel ways to motivate students by assessing their performance. The beauty and difficulty of teaching is that even though the student shows really low performance, the lecturer should be able to show a path to becoming a good citizen. As discussed earlier, a lecturer should not take only one measurement to assess students' performance.

Since there are different types of skills, assessments should be diversified. Afterwards, spurring can be initiated accordingly. The presented methods can be helpful in performing in online teaching.

Having discussed some methods to measure the student's performance, it was realized that most of the assessment methods has been changed nowadays because of remote teaching. Compared to physical assessment methods, these are a bit time-consuming. However, those are very effective in spurring students. This is mainly due to its usage of novel technology. However, teachers and learners should go through novel methods/ platforms and practice beforehand to get full advantage of them.

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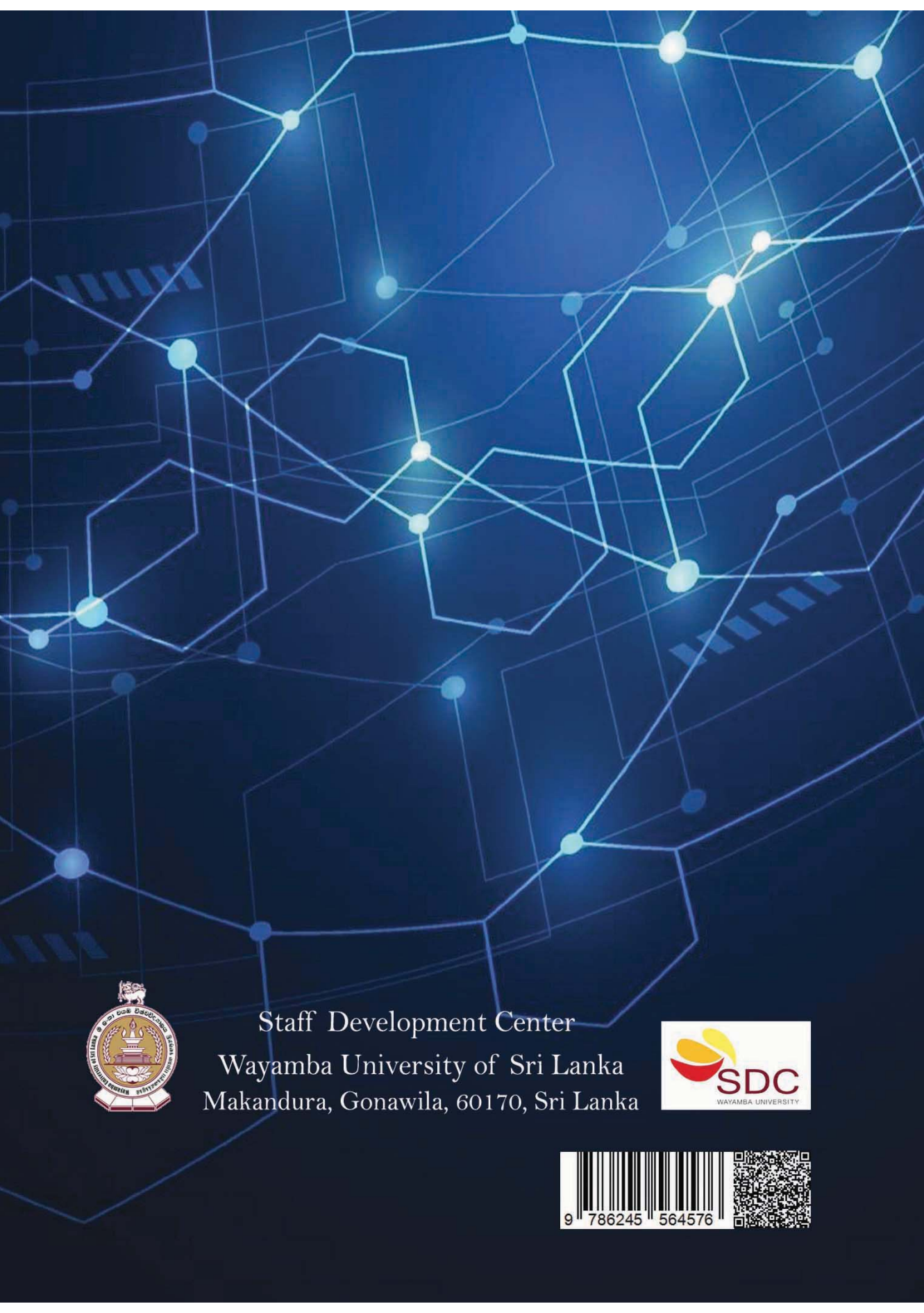

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