Implementing Education For Sustainability In Information Technology Course At Open University Malaysia

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ARTICLE INFO	ABSTRACT
Received:12/02/2024 Revised: 02/03/2024 Accepted: 15/03/2024	Recognising the crucial role of education in achieving sustainable development, this paper investigates the incorporation of Education for Sustainability (EfS) into the Information Technology (IT) course at Open University Malaysia (OUM). The goal is to develop and implement a curriculum integrating EfS, fostering sustainable thinking and practices in future educators and learners. Addressing the disconnect between environmental attitudes and actions, this study is guided by the Malaysian Education Blueprint and National Education Philosophy, aligning with Sustainable Development Goals (SDGs). A six-stage capacity-building approach and the DeCoRe+ technique are employed for curriculum revision, focusing on diagnosing, deconstructing, reconstructing, and implementing course content that emphasises SDGs. The revamped curriculum incorporates SDG elements aligned with the Six Learning Pillars, particularly in quality education, innovation, and responsible consumption. The DREAM methodology reveals positive changes in learners' knowledge, attitudes, and skills towards sustainability. Integrating EfS into the IT course at OUM represents a critical stride in embedding sustainability in various disciplines. This method proves vital for preparing educators and learners aware of their sustainable development role, demonstrating the effectiveness of curriculum transformation in meeting educational and societal goals aligned with SDGs. **Index** Terms—Curriculum Integration, Education for Sustainability, Information Technology in Education, Sustainable Development Goals

I. Introduction

For several decades, economic development focussed exclusively on profit has led to overexploitation and degradation of natural resources, leaving people dissatisfied [1] [2]. Various measures have been taken to overcome this phenomenon, but most of these efforts have failed. Educational institutions at all levels, even some universities, are to blame for the ongoing sustainability dilemma that plagues the entire world. This is because universities are institutions that produce consumers, leaders, and decision-makers who drive a consumer culture that is not alien and sustainable, coupled with the sole pursuit of profit [3]. So much so that Corcoran and Wals [4] stated that highly educated people's opposing views and treatment of natural systems have made natural resources what they are today.

Education must be the core for transforming universal development models that prioritize the criteria of sustainable well-being. Humans should be educated to pursue good well-being, namely the eudaimonic well-being suggested by the ancient Greek philosopher Aristotle – which is entirely contrary to the hedonic dimension of well-being, which is guided by poor behaviour for the world [5]. The concept of prosperity put forward by Makrakis [6] is a welfare effort emphasizing "sustainability justice," which consists of four milestones of prosperous development: the environment, society, economy, and culture.

Although significant investments have been made in environmental education, the focus on sustainable ecology is still neglected without developing a positive attitude or perception towards a sustainable

environment. A paradigm shift in curricula, teaching, and learning is needed to create a greater awareness of ecology, which will go hand in hand with a more meaningful knowledge and understanding of ecology until it leads to environmentally friendly action. However, previous and existing education does not raise the level of thinking, people, and life to sustainable aspects of the world. Therefore, Makrakis [7] claims that the highest level of education does not necessarily reflect a high level of sustainability for the environment. The incompatibility of environmental attitudes and activities has been discussed about other topics and educational strategies. Role-playing, hands-on science, and problem-based learning – the most relevant ones – should not be taken for granted compared to contemporary curriculum development lessons emphasizing sustainability aspects [2].

According to Kostoulas-Makrakis & Makrakis [8] and [1], one of the most significant challenges for universities in the 21st century is to train professionals who can critically analyze resources – the sources of supply up to the present – and change them to achieve the Sustainable Development Goals (SDGs). This challenge also applies to teachers in primary and secondary schools. Teachers and teaching staff serve as agents of change in promoting the Education for Sustainability (EfS) approach through teaching, learning, and curriculum [9] [10] and in designing sustainable schools [10] [11].

In the same development, Malaysia, through the Ministry of Housing and Local Government, launched the Local Agenda 21, parallel to the United Nations (UN) Rio Conference Resolution of 1992 [12]. To realize the programme area, the idea of sustainable development and its implementation must be embedded at all levels of society. This starts with the Third Malaysia Plan 1976-1980, which proves that the government has started to pay attention and build momentum towards universal sustainability [13]. Although Malaysia has achieved rapid growth in various industrial and infrastructure sectors, a more significant concern for preserving Malaysia's historical and cultural heritage has been raised [14].

The Malaysian Ministry of Education (MOE) developed an early childhood and post-secondary education curriculum in 2013, known as the Malaysian Education Development Plan (EDP) 2013-2025. This initiative sets a new direction for student teaching and learning. Consequently, the curriculum from early childhood through post-secondary education must be designed to meet the outlined learning outcomes in the action plan. This holistic approach ensures that students are supported in their potential through education. The educational reform plan includes 11 transformational steps, six student goals, and five system goals. The ministry aims for the entire educational system to achieve the following five system goals.

Firstly, ensuring complete enrolment from early childhood to upper secondary education is a key priority. Secondly, great emphasis is placed on quality, especially promoting high achievement in reading, maths, and science. Thirdly, equal opportunities must be created for all students, including those in urban and rural areas, from different socio-economic backgrounds, for males and females, for the Orang Asli community, and for children with special needs. Fourthly, promoting unity by encouraging students to embrace diversity while nurturing shared values and experiences is critical. Finally, increasing efficiency to maximize student outcomes within the existing national curriculum is essential.

The Malaysian National Philosophy of Education (NPE) was introduced in 1996 and is the basic principle and pillar of the national education system in Malaysia. According to the NPE, education should iteratively incubate and develop a person's potential in a balanced, integrated way to produce balanced and harmonic intellectual, spiritual, emotional, and physical. Therefore, Othman et al. [15] argue that NPE has a view and understanding of nature that jibes with the SDGs, particularly for the global SDG agenda support during 2016-2030 and the four pillars of the UNESCO Learning Plan for the 21st Century.

II. THE ICTeEfS PROJECT

The enormous environmental degradation is a by-product of rapid growth in the Asian region. Recent climate-related disasters in Asia are forcing policymakers to act very quickly to protect their countries and peoples and reverse the effects of ongoing climate change if they are to achieve sustainable growth in the future. One such strategy is EfS. While Asia's leaders advocate for responsible EfS and the realization of the Sustainable Development Goals, the teachers pass this on to the students who implement it in their classrooms.

These issues include information and communication technology (ICT) and the impact of climate change and environmental risks. This is another area that justifies the training of teachers in several Asian countries, including Malaysia. On the other hand, educational institutions need to revise their curricula by incorporating ICT-based education for sustainability. Therefore, teacher education and training curricula provide academic institutions with opportunities to integrate ICT into all available courses to enable EfS for all teachers. However, the integration of ICT is not only required concerning the ICT element as a subject or resource alone. Instead, it points to a change in pedagogy and learning that must be correctly planned and integrated for EfS through ICT in teacher education.

ICTeEfS aims to develop an ICT-based capacity-building program for in-service and trainee teachers, enabling them to apply the latest teaching methods and pedagogies focusing on EfS [16].

First, support the development of education faculties at partner universities to synchronize curriculum, teaching, learning, and research with the field of education for sustainability. Secondly, the expertise and skills of academic staff in these faculties should be improved to contribute effectively to developing and implementing teacher training programmes that entirely use ICT for EfS. Thirdly, to create an efficient, cost-effective, accessible, and innovative teacher education programme based on blended learning that emphasizes the integration of EfS into the current curriculum. Fourth, state-of-the-art teaching, learning, and curriculum materials should be developed as a multilingual e-toolkit integrating EfS into educational practice. Finally, a Euro-Asian education network should be established to strengthen cooperation in ICTeEfS and ensure the replicability of the successes achieved.

This research examines the process, practice, and product outcomes of revising the "Information Technology in Education" course at the Open University of Malaysia (OUM). Six essential questions are considered. The first question relates to "What" the course looked like before the revision, including the reasons that necessitated the revision, the number of students, the central theme of the course, the competencies that students were expected to acquire, the various teaching strategies and how students were to be assessed. The second and third questions relate to the "Why," while the "Where" explains where the existing gaps in the course should be addressed with the implementation of the revision. The "How" refers to how the revision and assessment of the course should be done or indicates the approach from implementation to assessment. The fifth question, "What now?" refers to how the course has been updated and revised and differs from the previous "What" question. The sixth or final question is, "So what?". It looks at the issues that have arisen during the process up to this moment – from the beginning to now – and how these issues will be addressed later.

III. RESEARCH OBJECTIVES

1. To evaluate the integration of the SDGs into IT education

This objective aims to assess how effectively the "Information Technology in Education" course at the Open University of Malaysia incorporates the principles of the SDGs and the impact of this integration on students' knowledge, attitude, and behaviour towards sustainability.

2. To assess the impact of the revised curriculum and innovative teaching methods on students' competencies

This objective focuses on analyzing the outcomes of the curriculum revision and the introduction of innovative teaching methods such as DeCoRe+ and DREAM on students' development of critical competencies, including critical thinking, IT skills, and leadership skills, in the context of sustainable education.

3. To identify challenges and solutions in the implementation of EfS in higher education

This objective aims to explore the challenges higher education institutions (HEIs) face in integrating EfS into their curricula and propose practical solutions to improve the integration of sustainability education, thereby promoting a broader commitment to sustainable practices among students and faculty.

IV. THE "WHAT", "WHY", AND "WHERE" QUESTIONS FOR REVISING OUM "INFORMATION TECHNOLOGY IN EDUCATION" COURSE

OUM offers 54-degree programmes, 28 of which are at the undergraduate level (i.e., diploma and bachelor's degree) and 26 at the postgraduate level (i.e., master's degree and doctorate). The University's academic calendar is divided into three equal semesters. Approximately 27,000 active students can access about 650 courses or subjects each semester. Students typically take three courses per semester until graduation [17].

The OUM supports its pedagogical approach with a blended online pedagogy, the Community of Inquiry (COI) engagement model, formulated by Garrison et al. [18] as shown below.
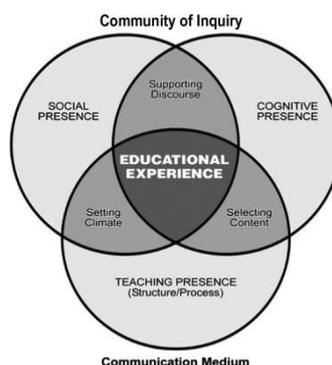

Figure 1. *Community of Inquiry (COI) Model*

This pedagogy consists of fully synchronized, face-to-face tutorials. They are held via the Google Meet application to ensure the necessary interaction between student and lecturer – this activity is called "Teaching Attendance". The other half, i.e., the asynchronous online forum, also known as "Online Class Participation" (OCP), is for students to interact with their fellow students – the social presence area. Secondly, cognitive presence involves using a learning management system such as "myINSPIRE", where students can interact with the learning materials.

In addition to the most crucial content areas covered in this subject, this module also contains a section on "self-control" and "activity". After working with the module's learning materials, students can test their knowledge by solving the tasks in groups or individually. E-lessons developed for the topics of the next module support the students in their learning process. The topics' content is compiled with links to the module content, streaming videos, and additional reading or reference sources. E-learning also provides solutions to related learning problems through discussion groups and self-tests.

Why is this course chosen?

The "Information Technology in Education" course is offered to students studying the "Bachelor of Education: Teaching at the Primary Level with Honours" (Open University Malaysia, 2023). This course enables students to learn and apply information technology (IT) specifically in an educational context. It includes an introduction to IT, the use of standard application software, IT in the management of teaching and learning, an introduction to the Internet, computer-assisted teaching and learning, the assessment of teaching materials, and the integration of IT into teaching and learning.

Competences to be developed

The various knowledge and skills that students acquire in this course should be able to promote the development of several aspects. Firstly, outline the basic IT principles in the existing educational system. Secondly, to apply the various principles of IT in teaching and learning activities inside and outside the classroom. Third, integrating web applications into teaching strategies through software and hardware. Fourth, the ability to acquire knowledge and develop skills that utilize IT as a tool for effective teaching and learning inside and outside the classroom.

As these skills are essential in the modern world, knowledge and understanding of IT-related matters will prepare future teachers to be IT competent. Students can focus on specific topics to integrate sustainability principles into their teaching and learning processes in the classroom.

The content of this course can be mapped to the SDG goals, as shown in Table 1 below.

Table 1. *Course Content Mapping With SDGs*

Course Content	SDG			
	4	9	12	17
Introduction to IT	•	•		
Word Processing			•	
Electronic Presentations			•	
Electronic Spreadsheets			•	
IT Management in Teaching & Learning				•
Internet	•	•		
Computer-Aided Teaching & Learning (CATL)		•		
Course Software Evaluation		•		
Integration of ICT in Teaching & Learning				•

Understanding the information in the table above is crucial as it forms the basis for training competent future educators. This is a cornerstone for current and future educational practices [19]. Mastery of tools such as word processing software, electronic presentation software, and spreadsheets is essential for teaching activities inside and outside the classroom. In addition, educators need to be proficient in using networks, the Internet, and specialized software systems for teaching and learning in the classroom.

A solid IT knowledge and skills foundation enables students to develop essential skills. These include problem-solving, leadership, effective communication, teamwork, and critical and creative thinking [20].

In addition, all elements of the "ICT-enabling tools for the 10Cs" can be linked to the content of this course, such as (i) communication, (ii) collaboration, (iii) creativity and innovation, (iv) connectivity and networking, (v) critical awareness, (vi) critical reflection, (vii) cross-cultural/intercultural competence, (viii) co-responsibility, (ix) knowledge building and (x) critical thinking and problem-solving.

On the myINSPIRE learning platform, students interact with their tutors and fellow students to creatively exchange and present ideas – in writing, orally, and online [17]. Students must think critically to tackle various problems and phenomena despite the online environment. This requires them to make informed decisions and take appropriate action. This includes conceptualizing, applying, analyzing, summarising, and evaluating the information received or collected. During OCP, students are encouraged to contribute

innovative ideas to developing new applications and solutions, especially from an IT perspective in education. To develop intercultural competence, students can explore projects such as developing educational software that incorporates different cultural perspectives and involves students from various racial, religious, and cultural backgrounds and thus does not focus solely on classroom content.

The assessment for this course consists of coursework and a final examination. The coursework is weighted 60% and consists of written assignments, OCPs, and online activities. The online final exam will be weighted 40% [17].

V. METHODOLOGIES

The "How" Question

Makrakis (2006) recommended a "six-step capacity-building methodology" to teach academic staff how to incorporate elements of "sustainability" into their courses based on the characteristics, needs, and objectives discussed earlier. The methodology is illustrated in the figure below.

   The first phase is about diagnosing each prospective teacher's didactic profile. The action plan for the training is drawn up after analyzing the profile of each prospective teacher, i.e., in the second phase. The training materials combine theory and practice and are organized thematically into units or modules that can be further developed according to the action plan, taking into account the needs of the trainee teachers: the third phase. The objectives of the action plan are compared with the initial profile of the trainee teachers and the assessment of their learning outcomes: the fourth phase. Finalists and students undergo the same assessment process by applying their recently acquired knowledge in the classroom (in the fifth phase). Continuous monitoring and improvement systems are integrated at all levels (the sixth and final phase) to ensure appropriate professional development.

Figure 2. *A Capacity Building Model*

Redesigning this course with the 17 SDGs in mind was carried out using the work of Vouzaxakis and Makrakis [21] on the DeCoRe+ technique. This view of the design process envisages the development of a modified curriculum and considers the curriculum a "living document". It means what it says and is defined as a DeCoRe+ technique.
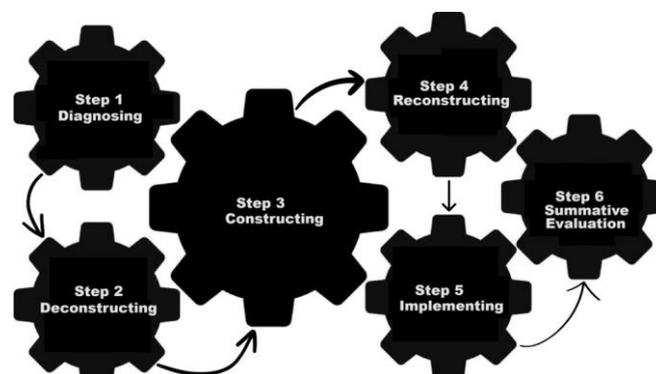

Figure 3. *The DeCoRe+ Techniques*

The following processes are involved in this technique. Firstly, "diagnosis" involves reflecting on (a) our identity, (b) our existing knowledge, (c) our future goals, and (d) the reasons for our goals. Secondly, "deconstructing" refers to critically analyzing the role of the personal perspective, habitual thinking, and the

chosen curriculum units or modules. Thirdly, "constructing" is about gathering resources, formulating ideas, and constructing new perspectives or meanings. Fourthly, "reconstruction" means that the newly acquired knowledge is integrated into the revised frame of reference. The fifth process, "implementation", involves the delivery of an updated curriculum unit or module, including additional learning opportunities. The sixth or final process, "closure", involves reflecting on and evaluating what has been learned and the changes made.

The course has been thoroughly analyzed to detail the key objectives, strategies, and assessments that must be implemented. The primary content – IT functions and discussions of everyday scenarios from a learning perspective – connects to real-world issues and actions. It also addresses critical social, cultural, and environmental challenges aligned with the components of the SDGs. The next phase is the construction phase, which is about gathering information, developing ideas, and gaining new insights into the course. The newly created knowledge is integrated into a revised frame of reference in the reconstruction phase. This course promotes different types of knowledge, including technical knowledge (mediated by information transfer) that focuses on IT concepts, basic IT principles for education, and other related features. Practical knowledge, which emphasizes a thorough understanding through the application of IT in various educational contexts, is also a focus. The course promotes "emancipatory" knowledge by incorporating sustainable values into the discussions and encouraging students to participate, creating the conditions for empowerment and change toward a sustainable society. This approach aims to make students more aware and responsible human beings. Reconstructed curriculum units or modules are introduced with service learning as part of the course implementation. This serves to complete the process cycle. At the end of the course, a reflection takes place to review what has been learned and what has changed.

The DREAM Methodology (Diagnose, Review-Reflect, Explain, Assess, Manage), according to Makrakis [22], was used to evaluate the course during its delivery. This approach encompasses the whole course and examines what students bring to the course before it begins ("Diagnose"), their experiences during the course ("Review/Reflect and Clarify"), and their outcomes at the end of the course ("Assess and Manage"). This methodology acts as a critical action research process to evaluate the course and identify necessary improvements. In this methodology, students work under the guidance of the course instructor to create a portfolio that must be submitted at the end of the course. The instructor then analyses the DREAM portfolios and compiles a comprehensive report for the class. This analysis provides valuable insights for the instructor and students to discuss and implement course improvements. This process is summarised in the figure below.

Figure 2. *A Capacity Building Model*

VI.   FINDING AND DISCUSSION

Discussion on "Now What"

The course was carefully refined using the DeCORE+ technique. In addition, various aspects of the SDGs, the Six Pillars of Learning, and the 10C elements have been carefully integrated.

One of the integral parts of the SDGs is SDG 4, "Quality Education". This course gives students the knowledge and skills required for the modern age. It enables them to grasp and master various competencies, particularly those associated with contemporary teaching and learning methods. With these competencies, students can make an essential contribution to the development of the educational sector and drive innovation in teaching practice. The emergence of crises such as the COVID-19 pandemic has necessitated the introduction of new teaching strategies to replace traditional face-to-face events. This change aligns with SDG 9, "Industry, Innovation, and Infrastructure". In addition, the course aims to create a pedagogical framework that emphasizes the responsible use of resources, in line with SDG 12, "Responsible Consumption and Production". By fostering effective teachers, the course promotes the effective utilization of acquired knowledge and skills to improve the quality and effectiveness of teaching.

The course content and learning activities are closely linked to the "Six Pillars to Learning", which form the basis for "sustainable development" [23]. Each topic in this course is designed so that students "Learn to

know", as all topics presented are new to them. This approach ensures that students acquire new knowledge critical to their future educator role. With the acquisition of current knowledge and skills, their primary goal is to develop into effective teachers. This process epitomizes "Learning to be" and emphasizes the importance of relevant knowledge and skills. Students are encouraged to adopt and support the principle of "Learning to live together" by applying the knowledge they acquire. Course content is designed to help students understand the challenges of the teaching and learning process. Within OCP, students are expected to apply new ideas to understand ICT-related issues in education better. In addition, to promote cross-cultural or intercultural competence, students discuss applying ICT knowledge and skills in everyday life. The competencies acquired in this course are about "Learning how to do" things and environmental awareness. The skills and knowledge acquired will enable students to change themselves and their communities positively. The principles of justice learned through the course activities also encourage students to "Learn, give and share". This pillar emphasizes the importance of sharing ideas and finding optimal solutions using ICT tailored to the specific needs of students' environments. Collaborative learning strategies, such as those enabled by OUM's virtual learning platform myINSPIRE, play a crucial role. Students use this platform to communicate with fellow students and lecturers and exchange ideas and insights in writing, orally, and online.

This course empowers students to change their lives and positively impact society. It emphasizes the importance of developing solid ethical values, cultivating a positive attitude, and creating opportunities to influence others in meaningful ways. Although learning occurs online, students are challenged to think critically and engage with various topics. Students are encouraged to make informed decisions and take proactive steps using learning processes such as conceptualization, application, analysis, synthesis, and evaluation of the information gathered. Ultimately, this course equips students with valuable knowledge and practical skills that they can use to improve their own lives and contribute to their communities.

A comprehensive review has shown that every "ICT-enabling for 10C" element can be effectively integrated into the curriculum modules. The "communication" aspect is connected to the discussion activities facilitated through the "Live Forum" available on the learning platform. Similarly, the "collaboration" aspect is fostered through group tasks, where students collaborate to complete the learning assignments. "Creativity and innovation" are cultivated during the assessment phase, where students must demonstrate these skills in activities like "Electronic Presentations". The "thinking skills" element is emphasized through assessments where students develop plans to apply e-Forms in "Word Processing" topics. "Connectivity" skills are enhanced as students explore the "Network" topic. The course also stresses "critical reflection" through the "Evaluation of Learning Software" topic, encouraging students to contemplate software utility. "Critical awareness" is developed in the classroom through various educational software tools such as Microsoft Word, PowerPoint, and Excel. The "constructing knowledge" component is addressed as students learn to choose appropriate software, deepening their understanding of technology's role in education. The "inter/cross-cultural competence" aspect is nurtured by encouraging students to apply course content daily, respecting their environment's cultural, racial, and religious diversity. Finally, the "con-responsibility" element is integrated through the "Computer and Laboratory Maintenance" topic, underscoring the importance of shared responsibility in maintaining educational resources. These elements are seamlessly incorporated into the course content, enhancing the learning experience.

Challenges

The first hurdle was to enhance the module itself. OUM modules adhere to established templates, which require a thorough assessment to identify the areas that need to be changed. This process requires analytical precision in evaluating the content and inventive approaches to ensure that the new material blends seamlessly with the existing elements. In addition, the primary language of the reference sources poses a challenge as most of the SDG materials are written in English, necessitating translation into Malay. This translation process can be contentious due to possible discrepancies in conveying the same meanings. Fortunately, the DBP-DPRM online system provided by the Dewan Bahasa dan Pustaka (DBP) Malaysia has effectively overcome these coordination and linguistic challenges.

The biggest challenge in revising this course was to secure the commitment of all stakeholders, especially the OUM students undergoing teacher training, as well as the officials from the Malaysian MOE and the current school teachers. Initial discussions with the MOE officials began at the start of this project. The first meeting was with the MOE, who requested the approval of the study and project. Subsequently, discussions continued with Ministry officials at the national level, and various other meetings were held with State Education Departments (SED). The project's first phase, a survey, was conducted online in collaboration with the SED officials responsible for teacher education. Unfortunately, this phase was interrupted by the COVID-19 pandemic, which led to delays. However, the phase was successfully continued after the pandemic. Authorization and co-operation with the Ministry and the Department was granted so that the OUM could proceed with the planned teacher training for the teachers currently in service. Information and announcements about the research project were communicated to all relevant parties, followed by an official

invitation to the teachers to participate in the training workshop. This communication occurred online via the official SED website and the OUM portal.

The next task is to organize training for teachers in service. These trainings must comply with the SED guidelines, which state that they must be held only on the first and third Saturdays of each month and not coincide with school holidays. SED officials will review and approve the proposed schedule before the training.

The training sessions took place face-to-face in the Erasmus+ ICTeEfS computer lab on the main campus of OUM. Due to the spread of COVID-19, all sessions strictly adhered to the Standard Operating Procedures (SOP) set by the Malaysian Ministry of Health and the Malaysian National Safety Council.

Integrating the SDGs into this course aims to promote a deeper awareness and understanding among students. Through this understanding, students will become more sensitive to the events and issues affecting their lives, communities, nation, and the global landscape. They will realize the crucial role that knowledge of the SDGs plays in promoting global prosperity and harmony. In addition, participation in this course will enhance the understanding of students already familiar with the SDGs and lead to a more substantial commitment to these goals. Upon completing this course, students can share their knowledge of the SDGs and raise awareness in their communities.

Discussion "So What"

The course "Information Technology in Education" is scheduled for the January 2022 Semester. The class consists of eight male and two female students. Most of OUM's students are working adults aged 21 to over 60. Because OUM conducts all teaching and learning activities online, these students are scattered across the country. The DREAM methodology was used to assess this course.

In the initial phase, known as "Diagnose", it was found that most students were experiencing this course for the first time. Each student completed the questionnaire provided. Their professional tasks include teaching, service, and technical support. At the end of the semester, students must complete a comprehensive questionnaire consisting of both open-ended and multiple-choice questions. This survey is used to obtain feedback on the course and assess student learning progress.

In terms of technological efficiency, the results show that more than half of the students "often" or "very often" in aspects such as "access to online materials (such as e-books, journals, databases and the like)", "use of statistical tools (such as Microsoft Excel, IBM SPSS, Matlab and the like)", "use of communication platforms (such as websites, blogs, discussion forums, etc.)", "use of presentation tools (such as Microsoft PowerPoint, Google Slides, Prezi, etc.)", and "use of an e-learning platform (specifically myINSPIRE)".

Students who have completed the course have demonstrated technological skills and a great enthusiasm for exploring and participating in new activities. They take their time making decisions and always weigh things up thoroughly. Each can work together in a team, remain calm in discussions, and communicate effectively with others. They also strongly prefer practical tasks and love to take on challenges.

Most of these students confirmed that the course was relevant to their current professional activity and responded positively to the question: "Can they improve their professional skills after completing the course?". They agreed that participating in this course enables them to "apply the knowledge and skills acquired in their daily work" and gain "new insights" that help them to "make more informed decisions", particularly about sustainability issues.

Students cited several vital course areas as the most impactful, including critical thinking, game-based learning, visual learning, the Internet, ICT, instructional objectives, technology and design, induction strategies, student assessment, and effective teaching practices.
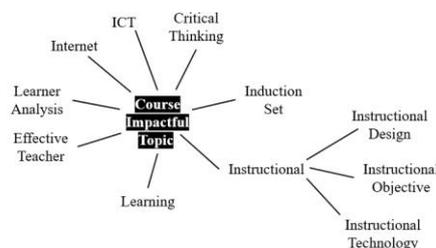

Fig. 5. *The Course Impact Factors Before DREAM*

While participating in this course, students were asked to reflect on their learning experiences. They expressed that one of the positive aspects was that "the course sparked their interest" because "various new knowledge and skills were integrated that went beyond what they already knew". This resulted in them willingly engaging in the course's planned learning activities. The outcomes also "emphasized and deepened their understanding of the SDGs goals", "enabling them to apply this knowledge in future scenarios". However, one student took the opposite view, stating that "the course provided limited learning

opportunities", which seems to be an isolated criticism compared to the generally positive feedback from the other students.

Students are also asked to reflect on their expectations of the course. Some aspects they highlighted are "more visual aids during lessons", "more time to complete assignments", "a more approachable demeanour from e-tutors", and "the use of more adaptable assessment methods".

In addition, quantitative feedback was collected on experiences that differed from initial expectations and unexpected aspects. The most frequently mentioned differences were: "the course provides engaging visual learning tools", "the e-lessons effectively enhance the learning experience", "the e-tutors show creativity and innovation in their teaching", "recorded tutor sessions are available for later review", and "knowledge of the SDGs has improved".

Following this, students were invited to reflect on the unexpected outcomes of the course. They expressed various emotions, including "joy", "acceptance", and "excitement" as they navigated through the material. Additionally, the students proposed several enhancements for the course, such as "incorporating more collaborative projects focused on the SDGs", "offering practice questions with detailed formatting", "extending deadlines for assignments", and "promoting active student engagement in learning activities", as well as "integrating more modern educational techniques suitable for the 21st century."

The students gave two main reasons why the course exceeded expectations. Firstly, they wished for more 'interactive sessions'. They believe these sessions could foster better communication with the lecturers and fellow students, improving their understanding of different concepts and skills. Secondly, they pointed out that the "deadline for assignments" should be more flexible. Many juggle work, family, and social commitments, making it difficult to meet tight deadlines. Extending the deadline would allow them to manage their assignments better and provide more thoughtful and thorough answers.

Based on the above discussions, improvement aspects were successfully identified and mapped, as shown in the figure below.
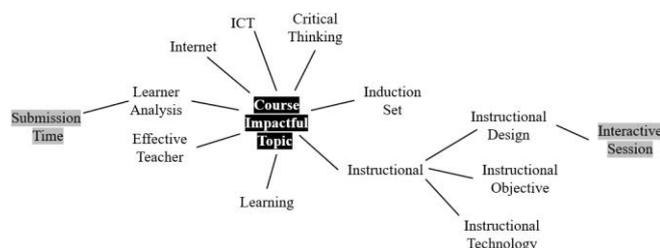

Fig. 6. *The Course Impact Factors After DREAM Methodology Applied*

In the "Assess" phase, students were asked to assess the impact of their learning on "academic development". The results showed that students agreed that they had 'increased their knowledge of the SDGs' and improved their "ICT skills". They also felt that they had "improved their ability to find reliable educational resources", which is essential for their upcoming teaching and learning activities in the classroom.

In terms of "professional growth", students state that after completing this course, they will be able to "apply the knowledge gained in their profession", "improve their effectiveness in daily tasks", "improve their professional role", and "develop their leadership skills".

In terms of "social development", students have expressed that they have "learned to work effectively in groups" and "improved their interpersonal skills". This progress is particularly evident through the communication activities, making the SDG theme an exciting topic for class discussion.

Regarding "personal development", students reported being "more open-minded about the SDGs" than before. They also stated they are "more confident in decision-making" and can better express "new and bold ideas" among their peers. They have also become "more aware of more sustainable teaching and learning activities, particularly in the context of the SDGs".

Students are also asked to make suggestions for improvements if they repeat the course. Recommendations include that "this course should emphasize the importance of behavioural and socio-emotional aspects in students' development". They also desire to "learn more about new knowledge, particularly in the area of sustainable living" to "improve their sensitivity and self-confidence both in the role of teacher and daily life".

In the final phase, students are asked to make "Suggestions" on how to use the knowledge they acquired in this course in their future endeavours. Various recommendations were made, such as "increasing engagement in SDG initiatives", "using a mix of course content and SDG principles in pedagogical practice", "linking everyday actions to sustainability concepts, incorporating ICT tools in both personal and professional contexts", supporting those in need, and "applying the newly acquired knowledge (whether related to the SDGs or otherwise)" in their teaching activities.

VII. Conclusion

The SDGs have been incorporated into the Malaysian curriculum, particularly in science, technology, engineering, and maths (STEM) (Ho et al., 2016). While many educators are aware of the SDGs, their focus tends to be on STEM subjects, which may explain why some do not realize that the SDGs are relevant to a broader range of disciplines. Teachers must be encouraged to integrate SDG elements into their teaching practice across all subjects. This approach raises awareness and enriches students' understanding of global issues. Familiarising teachers, students, and communities with the SDGs can inspire them to integrate these goals into their daily lives, benefiting future generations.

This study shows that ESD effectively sensitizes the public to the SDGs, starting with schoolchildren taught by qualified educators. It also shows that the SDGs can be integrated into any subject area, not just STEM subjects, to promote the overarching goal of global sustainability.

VIII. Acknowledgement

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