EXPLORING THE DESIGN OF ONLINE CONTENT FOR E-LEARNING

Soo Kum Yoke
Universiti Teknologi MARA Cawangan Negeri Sembilan, Kampus Rembau
sooku607@uitm.edu.my

Nor Haniza Hasan
Universiti Teknologi MARA Cawangan Negeri Sembilan, Kampus Rembau
norha207@uitm.edu.my

Tuan Sarifah Aini Syed Ahmad
Universiti Teknologi MARA Cawangan Negeri Sembilan, Kampus Seremban
tsyaini@uitm.edu.my

Noriah Ismail
Universiti Teknologi MARA Cawangan Johor, Kampus Segamat
noriah135@uitm.edu.my

Saunah Zainon
Universiti Teknologi MARA Cawangan Johor, Kampus Segamat
sauna509@uitm.edu.my

Mohammad bin Abdullah
Universiti Teknologi MARA Cawangan Johor, Kampus Pasir Gudang
moham3767@uitm.edu.my

Abstract: Due to the uncertain state of the Covid-19 pandemic, the education system has been thrown off-guard and ill-prepared to cope with online lessons. As such, this paper aims to explore the online learning experience of both instructors and learners in a situation where they have to continue teaching and learning sessions without face-to-face contact. The paper explores the different models for designing e-learning content and the pedagogical benefits and challenges that has to be considered for the disseminating of knowledge and information. Inadequacies of offline content have also been researched. Finally, the study puts forth recommendations as to whether online contents can be used for e-learning.

Keywords: e-learning, hybrid ebooks, online content, online design, design models

1. Background of the study

To deal with the current Covid-19 pandemic, classrooms have gone virtual in attempts to facilitate teaching and learning without face-to-face physical contact. Studies have shown that there are pros and cons to this. Some studies indicate a rise in anxiety and stress among students. Students and teachers face problems communicating due to poor Wi-Fi accessibility and lack of technology know-hows (Raes, Vanneste, Perters, Windey, Den Noortgate & Depaepe, 2020). However, there are also studies that have found that e-learning has benefits. By means of virtual classrooms, flexible learning is promoted. Learners are able to communicate more freely and the internet provides an enormous source of educational resources that enable learning to take place virtually (Lakhal, Bateman & Bedard, 2017; Soo, Ahmad & Hasan, 2019).

It is important to make available educational resources to students in order to enhance their learning experience in a virtual context. Printed materials are no longer the first choice for dissemination of content as students go through a transformation of the education system from face-to-face physical classroom environments to virtual classrooms via online platforms. As such e-books and e-modules have become more and more feasible to dispense learning contents to students.

There are various eBooks made available online and they come in different formats. Among the varieties are flipbooks and pdf contents. In India, hybrid modules deemed as textbooks, were designed for Ayurveda education with the purpose of comparing the hybrid formats with conventional teacher-centered learning. The findings showed that there was great potential for the use of the hybrid modules with greater acceptance for the modules compared to the conventional method (More, Singh & Patwardhan, 2020).

In Malaysia, the government imposed the Movement Control Order (MCO) under the Prevention and Control of Infectious Diseases Act 1988 and the Police Act 1967 starting from 18 March 2020. All pre-schools, private and government schools, residential schools, international schools including pre-university institutions and private and public institutions of higher learning were forced to close (NST, 16 March 2020). One of the many challenges faced included not being able to use the printed textbooks online. This study, therefore, will explore several aspects dealing with online content for students by means of the design and development of hybrid textbook contents. Firstly, the study will investigate how designing online content differs from printed textbooks. Then, the study will examine the pedagogical benefits of using online content as textbooks. Further, the study will investigate the pedagogical challenges in the implementation of the online content and in addition, the study will look at the limitations of offline contents i.e. printed materials. Finally, recommendations will be discussed in the conclusion.

2. Designing online content

Designing online content basically follows the basic format of designing offline printed content. The content should follow the curriculum and syllabus set by the Ministry of Education. It therefore should be designed and modeled to meet the level and needs of the students. It should be reader friendly and worded in a comprehensible manner. Graphics and pictures included in the books can enhance learning and understanding. The content should be valid and reliable as it would be molding growing mindsets of young children.

Traditionally, textbooks have been used by both students and teachers as an important source of information and knowledge. For hundreds of years, textbooks have been usefully contributing to education at all levels (Skinner & Howes, 2013).

Generally, the difference between the e-book and printed book is that the content in e-books will be placed in softcopy instead of in hardcopy. There is no physical book unless the material is printed from the online materials. Also, hardcopies are usually retrieved from bookshops. These days however, readers are able to purchase hardcopies and softcopies online.

There are several design models for designing instructional materials that e-learning designers refer to. This includes the ADDIE Model, Merrill's principles of Instruction, Gagne's Nine Events of Instructions and Bloom's Taxonomy (Gutierrez, 2018).

2.1 ADDIE model

ADDIE is an abbreviation of Analysis, Design, Develop, Implement and Evaluate. In this model, the first step in designing instructional materials is Analysis. The instructional designer has to find out who the target learners are and what are their needs and expectations for the materials. This is followed by the next step, Design. This requires selecting the strategy to follow, providing the objectives and appropriate delivery methods. The third step is Develop. This is where the instructional designer uses agreed expectations of the design phase to develop the course materials. The fourth step is Implementation. The materials designed are handed to the learners to use and are monitored for its impact. The final step is Evaluation. After the materials have been utilized, an evaluation is done based on learner feedback, surveys and data analysis to make improvements where necessary.

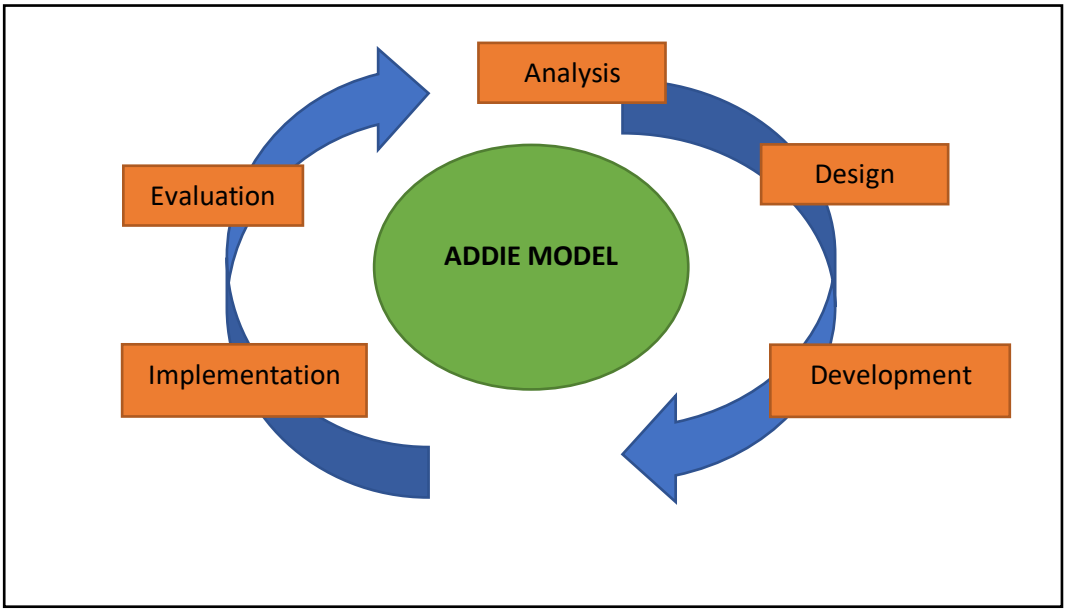

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Figure 1: ADDIE Model

Interestingly, some arguments have been raised regarding this model. Hokanson, Miller and Hooper (2008) argued that ADDIE is a process where instructional designers can design, develop, and implement instructional media and learning environments but does not encourage innovation in designing. This is in view of the criticism of its linear nature. However, it is this linear process that characterizes the model's step-by-step sequence of teaching and definite clear objectives which is well-structured (Rodriguez, 2012). Another added strength is that it is cost effective and saves time for the learner and instructor. This is due to its consistency which provides for effective training and results in effective learning. As such, although there are many models, the ADDIE model is still relevant and is incorporated in other models as a basic concept for instructional design.

2.1.1 Merrill's Principles of Instruction (MPI)

MPI is considered as the first principles of instruction. The purpose of this design is to provide maximum knowledge to each course. In 2002, David Merril who founded this framework, came up with 5 principles of learning which are (1) Task-centered principle. This is where learning takes place with real-world problems that students can relate to and can handle.; (2) Activation principle. This is where previous knowledge of the students is activated in order to connect to new knowledge to enhance learning.; (3) Demonstration principle. This principle applies to visually or through story telling explaining the content so that it triggers different regions of the brain in order to retain the information longer.; (4) Application principle. By means of practice and learning from mistakes made, students are able to apply new information learnt.; and (5) Integration principle. This is where possibilities for integrating the knowledge into the learner's world through discussions, reflection, and presentation of new knowledge can be done.

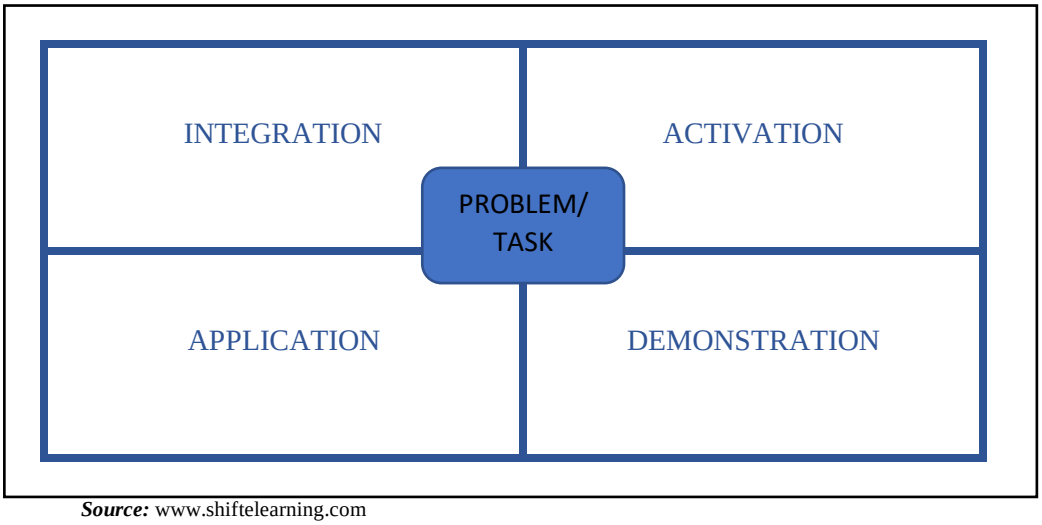

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Figure 2: Merrill's Principles of Instruction

Basically, a principle is different from a method but may offer guidance to help learners in their learning (Reigeluth, 1999). Merrill's principles of instructions as such offers theoretical principles to be applied to learning. So while they offer instructional theories to teach effectively, they do not identify the methods of instructions (Gardner, 2010). In reality, Merrill's principles has similarity with problem-based learning. For example, Merrill's principles application offers timely e-learning feedback so online learners can identify areas of improvement to problem-solve effectively in real-world environments. This intervention of feedback allows learners to make improvements (Pappas, 2017). The strength in this model is that the focus is on the learners. And the model is skewed towards the learner's success. However, although this seems effective, it is often difficult to apply as it is not easy to transfer theory to practice in instructional design.

2.2 Gagne's nine events of instruction

This framework was proposed by Robert Gagne and it is based on the behaviourist approach to learning. The instructional design process is systematic, creating a flexible model that can be adapted according to different learning situations. Till date, it is the most popular design model for developing effective e-learning. There are nine steps to this design. Step 1 is to gain attention of students through stimuli or questions that are thought-provoking. This is followed by Step 2, which is to state the objectives clearly to enable expected outcomes and to measure student's achievements. Step 3 is to help students recall prior or existing knowledge before building on new knowledge. Step 4 requires presenting the content in attainable chunks. This is followed by Step 5, which is to guide the students with examples and supplement content. Step 6 ensues with activities to elicit performance so that students can recall, utilize and evaluate the knowledge gained. In step 7, reinforcement is provided based on feedback either through remedial or enrichment activities. This is followed by step 8 where students will be assessed through a test of their knowledge. And finally, step 9 is to enhance retention through strategies like concept maps, summarizing or rephrasing.

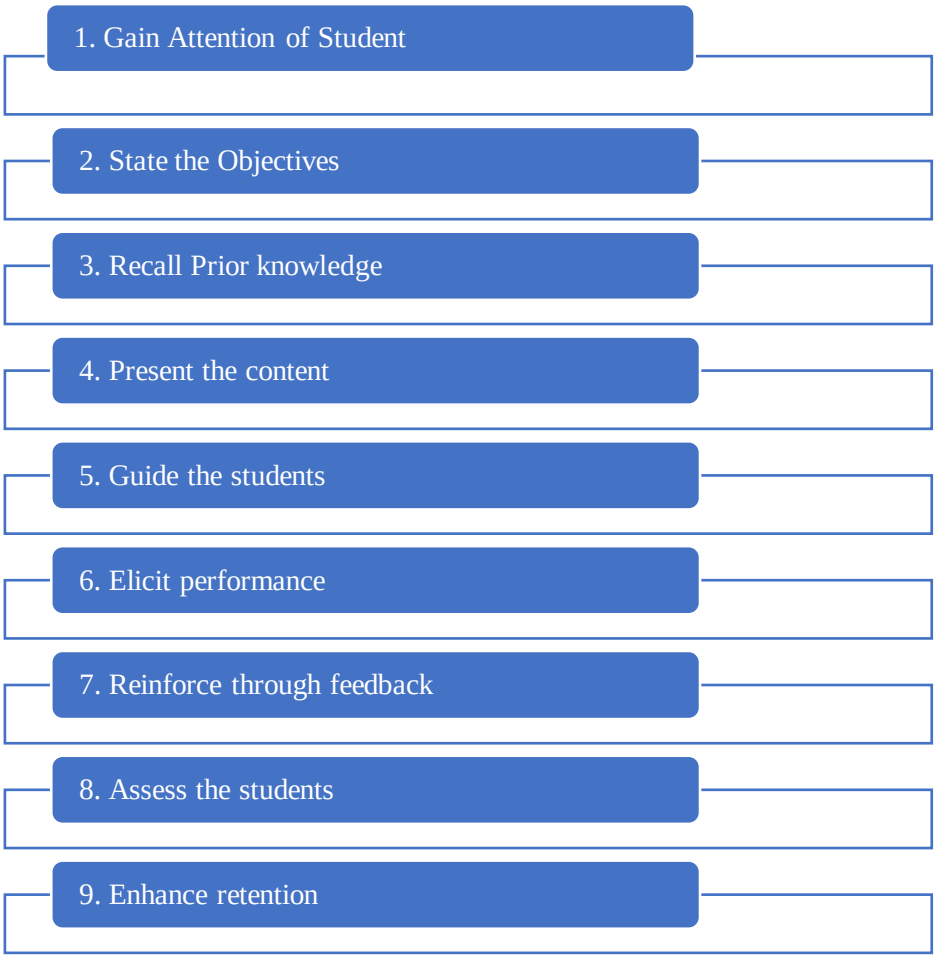

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Figure 3: Gagne's Nine Events of Instruction

Corry (1996) in his testimony as a user of this model stated that he found the theory has helped him to better organize his thoughts and objectives for the instructional lesson. However, several weaknesses were also pointed out. Firstly, the cumbersome effort to place the objectives according to the standard verbs provided by Gagne and the uneasiness of deciding whether the objectives were placed correctly according to Gagne's learning outcome theory. Secondly, the problem of creating objectives using Gagne's standard verbs impeded confidence in applying the model. Otherwise, the model seemed to be beneficial in structuring and planning lessons better. So in short, although this model seemed rigid, following the instructions can prove beneficial.

2.3 Bloom's taxonomy

Bloom's Taxonomy is a classification system to describe the different levels of cognitive learning introduced by Benjamin Bloom in 1956. The 6 levels in hierarchical order are Knowledge (level 1), Comprehension (level 2), Application (level 3), Analysis (level 4), Synthesis (level 5) and, Evaluation (level 6). In 2001, Anderson and Krathwohl revised the 6 levels to Remembering (level 1), Understanding (level 2), Applying (level 3), Analysing (level 4), Evaluating (level 5) and, Creating (level 6). The taxonomy pushes the learners past the first three lower levels to the next three higher levels to develop the learner's individual process of solving problems. This helps establish learning objectives Band engages the learners in gaining new knowledge.

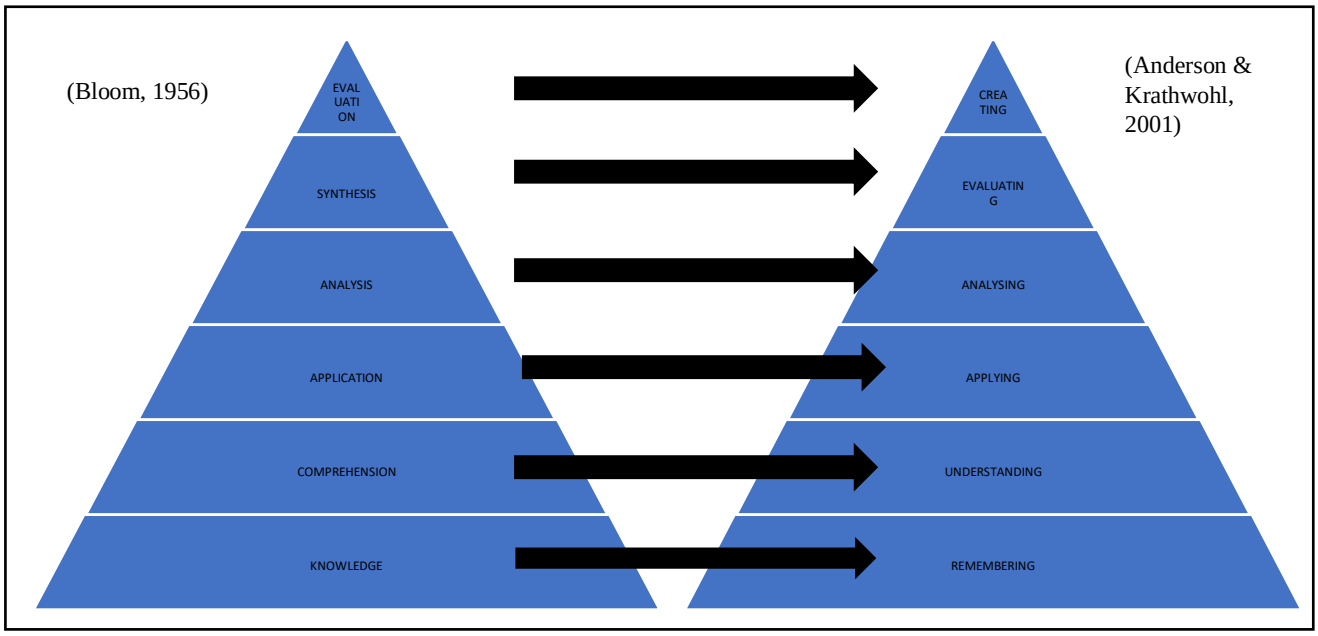

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Figure 4: Bloom's Taxonomy

This model is considered one of the crucial models that contribute to the curriculum development in the 21st century. It is a skeleton that was constructed to categorize the goals of curriculums both explicitly and implicitly according to cognitive skills and abilities of learners (Soozandehfar and Adeli, 2016). In today's world however, educators have come to realise that teaching and learning involves more than just the ability to think. Socio-cultural environment involving feelings and beliefs also help to shape the learning process. According to Marzano (2000), the structure of Taxonomy itself from the simplest level of knowledge to higher order thinking, is not supported by research. However, the Taxonomy provides a systematic structure of labelling the various levels of thinking to measure thinking skills and abilities. As such, while there is criticism to this model, it is still one that has been widely accepted in education systems till date.

3. Pedagogical Benefits and Challenges

It is interesting to note that all the models for online content design are applicable till date. Bloom's Taxonomy gained popularity in the early 21st century as it is able to measure lower level thinking and higher level thinking among learners based on the thinking skills they are able to apply. However, when building content for learning, any of the model may be adopted for content development without reservations.

The models provide a pattern for designers in preparing their contents. This is important to get the desired end results. How a learner can benefit from the content depends on how user-friendly the online content is. Physical display on screen has to be attractive. For example, choice of background colours or themes that are dull may put off the learner. Also, the font-size should be welcoming to the eyes. If it was too small, the learner may be put off from reading. Online designing provides more choices than offline content. The content can have audio and be in the form of visual animation. Also, learners online may click at a button on screen to be hooked to an interface or link for further information or elaboration of the content. Online content can also have feedback columns where learners can write their queries. A chatroom could also be set to provide online discussions. This can be done via platforms like google classrooms.

In a study by van den Berg (2020), it was found that student interaction in Online Distant learning is the key to successful lessons. Three types of interaction were discussed which include (1) student-content interaction, (2) student-teacher interaction, and (3) student-student interaction. Student-content interaction develops when students are able to create new knowledge by linking the new information with prior existing knowledge. Without this kind of interaction according to Bouhnik and Marcus

(2006), no learning can take place. Xiao (2017) states that the interaction between student and content is interactive. In the online environment, it can take place via video watching, multimedia interaction or searching for information through the internet (Abrami, Bernard, Bures, Borokhovski & Tamim, 2011). Student-teacher interaction is crucial as it can help to enhance interaction with content. A teacher has to have online presence so that the psychological and physical gap of distance learning can be overcome (Swan, 2002). This can be a challenge as the student and the lecturer both need to be committed to using the technology to bond. Student-student interaction is another avenue for online learning to take place successfully. Yu, Tian, Vogel and Kwok (2010) found that student-student interaction affected learning outcomes positively. In groups, students can share and discover learning together with the common goal of completing the task or given assignments.

In a study of students with disabilities of hearing, it was found that the use of Information and Communication Technologies (ICT) has enabled teaching and learning to successfully be conducted through innovative interactive applications and hybrid books (Kourbetis, Boukouras & Gelastopoulou, 2016).

According to Sukardjo, Ibrahim, Ningsih, and Nugroho (2020), online learning systems operate on different premises. Learners have to practice independent learning with limited help from their lecturers. In retrospect, learning resources such as audio tapes, broadcast TV, videos, internet platforms and so forth are used to support learning. Self-learning in this manner is often a challenge for learners and the outcomes may be less satisfactory when learning is not face-to-face. The quality of learning may be questioned for these learners and live sessions need to be a three-way communication or interaction between the instructor, learner and the technology used.

Similarly, in a study by Columbia University, it was found that the community college students did not fare well in online classes. Students who were from lower socioeconomic backgrounds were more likely to drop out from the online classes compared to the face-to-face classes. The rate of failures for online courses were also higher compared to offline face-to-face classes for this group (Crawford, Barker & Seyam, 2014).

4. Limitations of Offline Contents

Sibandze, Oloyede and Pereira (2020) found that offline content delivery had several drawbacks. Content in the offline mode are delivered by the instructor to the students in a scheduled time and specific place. In this classroom environment, one-to-one interaction is limited between the students and teacher. Also visual aids and materials are limited to the instructor's discretion (Nuruzzaman, 2016). Regardless of mastery of a lesson by the student, the teacher would move all students through the curriculum at the same pace and students who fall behind will not be able to progress.

Further, offline contents are usually limited to the textbooks in printed form. It takes time and a lot of effort to prepare the textbooks according to the syllabus. The material is static and not interchangeable. It cannot be easily updated with new information at a short space of time compared to online updates and revision. Offline contents also cannot be inserted with audio, animations, videos or other interactive materials like live feedback and email feedback. This would limit the learning to the scope of the textbook explanation and constrain creative and critical thinking outside the premise of the textbook.

5. Recommendations and Conclusion

The discussion thus far has explored the design of online content for e-learning by means of comparing the offline content dissemination with online content. Various design models for content development has been discussed and it was found that they were all viable with the Bloom's Taxonomy model being most viable as it can measure a learner's thinking skill.

Further, the discussion also looked at the benefits and challenges of online content for e-learning. From the various arguments that were put forward, it can be concluded that the pedagogical benefits of online content include: (1) the physical display features of online content that are interchangeable, (2) the interactive features of the online content that can be filled with videos, live chats, audios and so forth, (3) the convenience of updating the information online, (4) the flexibility of learning outside the

class time without the limitation of time and place, (5) disabled students are able to gain from innovative ICT materials like hybrid books and (6) learners can benefit by means of independent learning.

The challenges for implementing online content were also discussed in this paper. Some of the challenges include (1) the lack of presence of the teacher in online learning, (2) not all learners are able to self-learn or learn independently through online content for e-learning, and (3) students with low socioeconomic background were also found to lack interest in pursuing online learning.

Overall, the discussion shows that the education system will eminently move towards e-learning and thus online content has to be disseminated accordingly. The pandemic has actually fast forwarded learning with the use of technology. Content for e-learning has also to transform and printed textbooks or offline content has to move forward towards online content. At present, more and more books have gone 'ebook' such as flipbooks and hybrid books. Recommendations therefore are for contents and textbooks that have been the core source of learning for more than a century, to be converted to online forms in line with the transforming education system towards online learning. Innovative methods should be used to make learning fun and interesting. It is also recommended that the government and NGOs play a more active role by providing assistance for wifi accessibility to students and teachers. Not only teachers, but students should be equipped with computers and internet access as well as training on how to learn online.

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