THE TRIGGER-BASED DISCUSSION-ORIENTED CONTINUOUS LEARNING MODEL

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ABSTRACT

The paper explores current learning approaches. The authors present the Trigger-Based Discussion-Oriented Continuous learning model (TbDoC) that focuses on creating a continuous learning experience over the online and off-line (on-campus) learning environments. The model aims to create a more engaging learning environment that encourages discussion and increases the ability of students to be independent learners. The proposed learning model utilizes an adapted version of the Hook model, the simplification aspect of the Fogg behavior model, and a socio-educational approach to learning. The model starts with the lecturer sending the students an email on the night prior to the lecture. The email contains a set of questions related to the lecture material. The students are prompted to search for answers to the questions and in doing so they are preparing for the lecture. On the next day during the lecture, the lecturer begins to direct the student-to-lecturer discussion. The lecture material is fully uncovered by the students with the help of the lecturer through the discussion. The qualitative behaviour observations showed positive impact of the model on the students and the learning environment. It was observed that students became more independent learners and were more motivated to engage in the discussions.

KEYWORDS

Learning Model, HOOK Model, Fogg Behavior Model, Socio-Educational Environment

1. INTRODUCTION

Since the outbreak of COVID-19 pandemic in 2019, the world has undergone drastic changes across various fields. Integrating technology into various aspects of daily life has become a necessity to reduce human interaction and mitigate the spread of COVID-19. In the education field, this translated to a shift from face-to-face on-campus learning to the adoption of online learning.

After the pandemic, the education sector maintained an interest in integrating technology but most education institutes reverted back to off-line (on-campus) learning. This can be attributed to two main factors. Namely, that education is fundamentally based on human interaction and face-to-face communication and the limitations of online learning (Struthers et al., 2022; Sun et al., 2020). The limitations include the following: first, not all students or lecturers had access to the required technology or stable internet connection, second, the lack of instant feedback and face-to-face interaction, third, some lecturers struggled to adapt their teaching methods to the online environment which impacted the quality of teaching, forth, the lack of motivation and engagement, and fifth, the lack of practical implementation for courses that required hands-on practical application in labs and workshops (Koay et al., 2021; Struthers et al., 2022; Sun et al., 2020). Following the pandemic, educational institutes dedicated their efforts towards the integration of technology, enhancement of student engagement, and refinement of pedagogical approaches (Struthers et al., 2022). Consequently, a multitude of teaching methods emerged and previous teaching methods were enhanced.

The authors identified a research gap in establishing a seamless learning experience between the online and on-campus learning environments. The authors propose a new learning model named the Trigger-Based Discussion-Oriented Continuous Learning Model (TbDoC). The learning model incorporates and adapted version of the HOOK model, the simplification aspect of the Fogg behaviour model, and a social aspect to encourage a socio-educational learning environment. The learning model focuses on creating a continuous learning experience between the online and off-line (on-campus) learning environments. The research goal is to explore the impact of implementing TbDoC and evaluate qualitatively if the learning model has an impact

on students' behaviour as well as identify if the learning model develops more independent learners and motivate discussion.

The paper is organised as follows section 2 details the literature review of learning approaches, the HOOK model, and the Fogg model focusing on the simplification aspect. Section 3 discusses the proposed learning model and the model's methodology. Section 4 details the implementation of the proposed learning model covering the model aspects. Section 5 sums up the conclusion. Section 6 discusses the future work.

2. LITERATURE REVIEW

The following section discusses different learning approaches including discussion-based learning, blended/hybrid learning, and collaborative learning. The section also discusses the HOOK model, the Fogg Behavioral model, and the socio-educational aspect of education.

2.1 Learning Approaches

First, the discussion-based learning approach focuses on interactive and collaborative learning discussions (Abdulbaki et al., 2018; Picault, 2021). The discussions are peer-to-peer discussions and peer-to-lecturer discussions. It is more likely that discussion-based learning environment takes place in the traditional offline environment where structured discussions, debates, group activities, and open dialogues take place. The goal of this approach is to actively engage students in critical thinking, analysis, and problem-solving through meaningful conversations. The key characteristics of the discussion-learning is that it is student-centered where critical-thinking, active participation, collaboration, diverse perspectives, and higher-order learning exist with the lecturer being the facilitator (Abdulbaki et al., 2018; Li & Pei, 2023; Picault, 2021). The approach aims to develop higher-order cognitive skills such as analysis, synthesis, evaluation, and application of knowledge.

Second, the blended/hybrid approach that combines both offline and online education (Li & Pei, 2023; Sharma et al., 2022; Stoian et al., 2022). Blended learning allows students to engage in the traditional education settings as well as virtual learning experience. This method is flexible by allowing students to access the course material and complete their assignments when it is convenient and at their own pace while maintaining the face-to-face sessions that enable monitoring and instant feedback. The curriculum is evaluated according to the learning objectives to decide which portions can be studied online and which require face-to-face interaction. The online portions are delivered to the students through the learning management system (LMS) in the form of lecture slides, lecture videos, quizzes, and reading lists. The on-campus portions are reserved for the material that require hands-on practice. Lecturers monitor the students learning process and can implement changes that would benefit the students as well as provide regular feedback. The goal of blended learning is to enhance engagement, allow for differentiated instruction, and provide flexibility in learning experiences.

Third, the collaborative learning approach which empathizes group activities and interactions to achieve learning objectives (Yang, 2023). Students work together on projects, discussions, and problem solving. The characteristics of this approach is teamwork, peer learning, and exchange of diverse perspectives (Yang, 2023). Students are organized in small groups that often consist of three to five students. Each group is given a clear objective per assigned task to provide the group with a direction that aligns with the educational outcome. Engaging activities take place during the session including, problem-solving tasks, group discussions, peer teaching, and brainstorming sessions. At the conclusion of the session, a debriefing session is conducted to consolidate the knowledge generated by each group, share valuable insights, and engage in final reflections on the content. The goal of collaborative learning is to enhance social skills, communication, and the ability to work effectively in groups.

Other methods have been developed such as online synchronous learning, online asynchronous learning, flipped class room, project-based learning, gamification, personalized learning, micro learning, and simulation learning (Koay et al., 2021; Struthers et al., 2022; Stoian et al., 2022; Sun et al., 2020). Each of the mentioned learning methods has its characteristics and method of implementation. All of the previous methods aim to enhance the effectiveness of education, improve student engagement, and facilitate meaningful learning experience. The learning methods either focus on one environment (online or offline) or attempt to combine both. However, in approaches that try to combine both environments, there is a separation between the activities carried out within each environment where the learning experience is discontinuous.

2.2 The Hook Model

The Hook model is developed to embed a need in the user to use the product repeatedly without being prompted due to consecutive iterations of the Hook cycle. The Hook model consists of trigger, action, variable reward, and investment elements (Eyal & Hoover, 2019).

The Hook model cycle was developed to alter the users' behavior and create a habit of using the product. It starts with a trigger that is external or internal, which then prompts the user to do an action, which then presents the user with a reward that varies in each iteration and, finally it asks the user to invest in the product with data (such as entering data into a form). Investing with personal data links the user to the product and prompts him/her to enter the cycle again. The more iterations that occur, the higher the target behavior is likely to be converted into a habit (Eyal & Hoover, 2019).

Triggers are activators of the behavior which can be present in two types, external or internal. External triggers cause the user to take action where information is embedded in the content of the trigger to tell the user what to do next. The required action is explicitly made clear to ensure that the user completes the required goal. Moreover, additional information about the next desired goal can be embedded to encourage the user to complete more than one goal. Internal triggers become present when the product is tightly coupled with a thought, an emotion, or a routine. Internal triggers are manifested by the users because of an emotion such as boredom, fear, or motivation. Actions ought to be simple and easy to accomplish. The user completes an action with the anticipation of a reward. Complex tasks should be broken down into simpler ones to encourage and facilitate their completion. The variable reward is a crucial part of the Hook cycle. The variability of the reward is what keeps the users re-entering the cycle. If the reward is constant the user already knows what they will receive and once they experience it once they would not redo the task. Investment is an important factor in habit formation. Investment in the system increases the likelihood of using the product and of successive iterations on the Hook cycle. Investments are aimed at long-term rewards and not short-term gratification like action. After the user receives the variable reward, the investment phase is presented to ask the user to do some work. Unlike actions which ought to be easy and simple to accomplish, investment requires the users' attention and time. The user is likely to put in the work to accomplish a task after receiving the variable reward. Moreover, the investment phase should be perceived by the user as a method to enhance their progress over time.

Delivering triggers at the right time is crucial to the success of the Hook Model because it can significantly impact the user's motivation to engage with the product (Eyal & Hoover, 2019). Delivering triggers at the right time is crucial because it enhances relevance, captures the user's attention, and boosts motivation, ultimately influencing the timing of user actions. Conversely, poorly timed triggers can go unnoticed or quickly forgotten, diminishing their effectiveness. By understanding the user's behavior, preferences, and context relevant triggers can be sent to the users to capture their attention, motivate them to take action, and create a habit-forming experience.There are numerous formats for external triggers. First, push notification is a message that pops up on a user's device prompting them to take an action or directing them to a specific task within an app. Second, emails can be used as external triggers to encourage users to take action. Emails are commonly used in ecommerce where companies send emails to users about a sale or promotion, prompting them to visit the website and make a purchase. Third, advertisements can be used as external triggers to direct users to a specific product or service. For instance, a social media platform may display an ad for a new game, prompting users to download and play the game. Fourth, call to action (CTA) is a button or link that prompts a user to take a specific action, such as signing up for a newsletter or making a purchase. CTAs are often used on websites or in email marketing campaigns.

2.3 Fogg Behavior Model & the Socio-Education Aspect

The Fogg behavior model consists of three elements. Namely, motivation, ability and prompts (triggers) which are the three main pillars that guide the target user to the required behavior (Fogg, 2009). In the Fogg behavior model triggers are referred to as prompts. The model states that the user is likely to respond successfully to a trigger that is received at a point of time where the user has high motivation and high ability to achieve the required task. The model suggests that all tasks prompted to the user should be simplified to increase the user's ability and motivation to accomplish the task (Fogg, 2009). Simplification is based on breaking complex tasks into smaller achievable ones where the users' cognitive effort is not overloaded.

The paper titled “A socio-educational app for digitally transforming online learning” proposed creating a socio-educational learning environment. The paper combined multiple techniques to create a socio-educational learning environment. For the scope of this paper the focus will be on the social aspect of education and the simplification of understanding the lecture content (Zekry & McKee, n.d.). The paper utilizes the Hook model and the simplification method from Fogg behavior model to create a habit of studying and to break down complex tasks into simple ones that can be achieved by the students (Fogg, 2009; Jalowski et al., 2019). The app addresses the challenge that faces students to understand the lecture content during one session. The paper mentions that students should be given simple tasks such as reading a small section about the lecture content, completing a quiz, or watching a video to prepare them to understand the lecture content. Accordingly, the students are gradually introduced to the lecture content, enabling them to develop an initial understanding of the lecture content.

A social presence in education is manifested in students’ interaction, heathy competition between peers, transfer of knowledge, and having the sense of community and belonging (Muthuprasad et al., 2021) Students’ interaction is a crucial part in education. It can be presented in the interaction of students with their peers and/or the interaction of the students with the lecturer. A learning environment that fosters interaction allows the transfer of knowledge and creates an engaging environment (Suhartini & Gultom, n.d.; Xiao et al., 2023).

3. PROPOSED LEARNING MODEL

The authors identified a research gap in establishing a seamless learning experience between the online and off-line (on-campus) learning environments. It was also observed that in most off-line learning environments the students listen to the lecturer explaining a concept without interacting with the lecturer. This results in a passive learning experience. The authors gathered feedback from graduate students’ who experienced online learning during the pandemic at the faculty of Informatics and Computer Sciences which in summary conveyed the complaint that online lectures were boring, monotonous, and lacked depth; and the only time they got interesting was when students asked questions, creating discussion. Accordingly, the authors decided to create a learning model that increases student engagement and encourages discussion. The authors propose a new learning model named the Trigger-Based Discussion-Oriented Continuous learning model (TbDoC). TbDoC is based on incorporating: (1) An adapted version of the HOOK model for habit formation. (2) The simplification aspect of the Fogg Behavior model presented in prepping for lecture. (3) A social aspect to encourage a socio-educational learning environment that fosters discussion. TbDoC aims to create a seamless integration between online and offline learning environments through a learning cycle that is initiated online and continues to the off-line environment. The research goal is to implement and evaluate qualitatively if the learning model has an impact on students’ behavior as well as identify if the learning model develops more independent learners and motivate discussion.

3.1 Implementation of the Learning Model

The experiments took place in the Informatics and Computer Sciences faculty for students of year 2 after prep who were registered for the Distributed Systems module in semester 2. Students registered in Distributed Systems module are students specializing in computer science, artificial intelligence, and computer networks. The students include male and female genders and are of the Egyptian nationality. The lecture spans two hours which is broken down into two parts, with a 20-minute break. The Trigger-Based Discussion-Oriented Continuous Learning Model(TbDoC) has the following characteristics: (1) Students exert effort to acquire and understand the information on their own. (2) Students start the learning process before the lecture. (3) Students discuss their findings with the lecturer during the lecture. (4) The lecturer monitors and directs the students’ discussions. The following section will discuss the building blocks of the TbDoC learning model. The lecturer being referred to is the 2nd author on this paper.

3.1.1 Preparing for Lecture

TbDoC simplifies the complex task of understanding the lecture material in one session. This is achieved by prompting the students to prepare ahead of the lecture. An email is sent to the students prior to the lecture, with a set of questions which the students should find answers to. The students are prompted to search for answers

and prepare for the lecture discussion. As students search for answers, they encounter information related to the lecture content. As a result, when the students participate in the discussion or observe the information exchange during the lecture, students will have the foundational understanding of the content being discussed. Having this previous knowledge makes it easier to understand new ideas, since they've been introduced to the concepts before.

3.1.2 Adapted HOOK Model

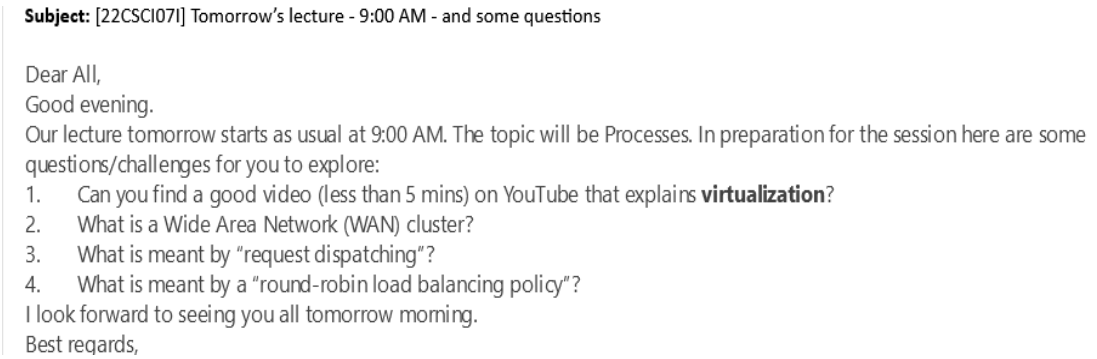
TbDoC adapts the HOOK model to create a habit of learning and discussion. The HOOK model is an arranged cycle of trigger, action, reward, and investment. TbDoC changes the arrangement of the cycle while maintain the core aspects of the HOOK model. TbDoC adaptation of the HOOK model begins with an external timed trigger, which is followed by the user's action. Subsequently, the investment takes place as a result of the user's action, leading to the reward. The cycle takes place over the online and off-line learning environments. The trigger, action, and investment take place online and the reward takes place off-line.

On the evening prior to the lecture, an email is sent to the students acting as the external timed trigger prompting the users to take action. The email clearly prompts the students to search for answers to the short questions in the email. Accordingly, the students start the action of searching for the questions' answers. By doing the action the students invest time and effort to properly find the answers and prepare for the lecture discussion next morning. Accordingly, investment takes place when the students prepare for the lecture discussion. During the off-line (on-campus) lecture the students are rewarded by being able to contribute to the discussion as well as having their attendance recorded for each part of the lecture.

Students who take part in TbDoC are likely develop a habit of independent learning and taking part in student-to-lecturer discussions.

3.1.3 The Email

The email is the timed external trigger sent by the lecturer to the students. The email is sent in the evening prior to the lecture. For instance, if the lecture is held on Wednesday at 9:00 AM the email is sent on Tuesday at 8:00 PM. The timing gives the students a defined window of time to prepare for the lecture. The email informs the students of the topic that will be discussed during the lecture followed by a set of questions. The students are asked to come up with answers to the questions in the email. The questions usually ask about important terminologies, concepts, and equations, or ask the student to search for a video. Figure 1 shows one of the emails sent by the lecturer.



Subject: [22CSCI07I] Tomorrow's lecture - 9:00 AM - and some questions

Dear All,
Good evening.
Our lecture tomorrow starts as usual at 9:00 AM. The topic will be Processes. In preparation for the session here are some questions/challenges for you to explore:

1. Can you find a good video (less than 5 mins) on YouTube that explains **virtualization**?
2. What is a Wide Area Network (WAN) cluster?
3. What is meant by "request dispatching"?
4. What is meant by a "round-robin load balancing policy"?

I look forward to seeing you all tomorrow morning.
Best regards,

Figure 1. Email Sample

The questions are formulated to be easily understood and enable the students to do the action required, that is to search for the answers. In the email content, the lecturer used common keywords for the chosen topic. The students did not have the lecture material to hand since it had not been uploaded to Learning Management System (LMS), so they were expected to explore the answers by searching on the Web. The email ends with "Looking forward to see you tomorrow morning". This statement reinforces the need for immediate action ("… tomorrow morning"). The statement also encourages the creation of a socio-educational learning environment by informally addressing the students ("Looking forward to see you …"). To foster a dynamic and engaging learning environment the use of friendly wording is important to encourage students to take part in a discussion that takes part during the lecture session.

3.2 On-Campus Discussion

The lecture session starts with the lecturer showing the opening slide that contains the lecture title followed a slide that outlines the topics to be covered in the session. The lecturer then shows a pdf or Word document with the contents of the email in order to focus on the questions.

The lecturer opens the discussion by asking the students what they found for the first question. Using the body language of the students as a guide the lecturer identifies students who are ready to offer input and selects a student to speak. The selected student then provides their input. The lecturer will then encourage other students to offer their input, focusing in particular if anyone has information different to that of the first student, as a means to get diverse inputs and deepen the discussion. If it appears that none of the students have attempted to find information on the topic, then the lecturer will ask the students attending the session to now search for information about the topic using their mobile phones. The lecturer deliberately avoids giving answers, putting the reliance on the students to do the exploration, prompting them into action to support the discussion. Some students come well prepared to the session and are keen to offer their findings and the lecturer has to both acknowledge their effort and input, but also to ensure that other students' inputs are acknowledged. After about 15 to 20 minutes of discussion, the lecturer recaps the topic based on the student inputs and provides additional information to support the lecture content. The lecturer then moves to another question on the list and the same approach to encouraging student input is taken.

Throughout the discussion, the lecturer tries to steer the students in a direction to ensure coverage of assigned lecture content. The important aspect of the discussion is that the topic/question is answered/uncovered by the students. The lecturer's role is to direct the conversation to the correct answer. As the semester continued, students got into the habit of preparing and discussing their answers.

An important feature of the Trigger-Based Discussion-Oriented Continuous learning model was the reliance on and encouragement of the students to find information for themselves. Therefore, the first sessions inspired the use of mobile phones during the lecture. Accordingly, the lecturer prompted the students to use their mobiles to search for information related to the questions and also when new terms arose from the findings that the students reported. The latter provided a deeper insight into the lecture topics and offered a way of engaging with "reading around the subject", an important part of student learning. In summary, the encouraged use of mobile phones in the lecture setting empowered students to increase their research skills and encourage knowledge seeking.

The lecturer balanced the discussion by adopting a casual and approaching tone while maintaining control of the discussion to encourage students to actively participate in the discussion without feeling concerned about the correctness or incorrectness of their input.

By utilizing the above approach, the lecturer was able to create a Trigger-Based Discussion-Oriented Continuous Learning Model that encourages discussion and knowledge seeking, which ultimately led to a deeper understanding of the lecture content.

3.3 Qualitative Behavior Observation

Throughout the semester, the lecturer carefully monitored the students' behavior to qualitatively evaluate the impact of TbDoC. The lecturer observed that the students' engagement in the sessions suggested four types of students. Type 1, students who are not triggered by the email and therefore do not search for the answers and are not able to engage in the discussion without further prompting during the session. Type 2, students who during the session search for the answer using keywords based on the email but take the first answer provided by the search engine. Meaning, type 2 students accept preliminary limited knowledge of the topic addressed by each question. They are prepared to engage moderately but need encouragement to search for other answers. Type 3, students who search for answers to the questions and aim to understand the concept and knowledge behind each. These students are prepared to engage actively. Type 4, students who do research on the topic and questions provided, and produce their own content or summary based on their understanding. These students are able to take the discussion beyond the concepts covered in the lecture. Type 2 students form the majority.

In the first lecture, the students appeared to be accepting of the approach where some students came prepared with answers to the questions and engaged with the discussion. As the semester continued, it was observed that the students became more habitual to the TbDoC. This was observed based on the increase of students coming to the lecture more prepared and eager to take part in the discussion. By time type 3 students were observed to increase. Students became more comfortable to take part in the student-to-lecturer discussion and more habitual to using their mobile phones to search for information and contribute to the discussion.

On one night, the lecturer decided not to send an email and observe the reaction of the students' behavior. On the same night the lecturer received emails from a student inquiring about the email and how the lecture will take place. This shows that the students anticipated the email and became habitual to receiving the external timed trigger to take action and prepare for the lecture. This also shows that the students want to be prepared to be able to take part in the discussion.

4. CONCLUSION

The paper introduced a new learning model named the Trigger-Based Discussion-Oriented Continuous Learning Model (TbDoC) which is based on incorporating: (1) An adapted version of the HOOK model for habit formation. (2) The simplification aspect of the Fogg Behavior model presented in prepping for lecture. (3) A social aspect to encourage a socio-educational learning environment that fosters discussion.

TbDoC aims to create a seamless experience between online and offline learning environments by initiating learning online and continuing over the off-line (on campus) environment. TbDoC starts online with the lecturer sending an email to the students on the night prior to the lecture. The email is the timed external trigger that prompts the students to take action and prepare for the lecture. The students prepare for the lecture by searching for answers to the questions in the email. When the students start the action of searching they invest time and effort to prepare for the lecture. The students' efforts are rewarded during the off-line (on-campus) lecture as they take part in the discussion and their attendance gets recorded.

The paper evaluated the qualitative impact of TbDoC on students' behavior. TbDoC was successful in influencing student behavior where the students became more independent learners and exhibited an increased willingness to take part in the student-to-lecturer discussion. It was observed that the students anticipated receiving the email and were habitual to the TbDoC. TbDoC employed a social aspect to education and was successful in creating a socio-educational environment that helped the students become comfortable to take part in the student-to-lecturer discussions. The learning experience was continuous across online and off-line (on-campus) learning environments without the need to use new learning tools which enabled seamless integration between both environments.

5. FUTURE WORK

For future work, the effect of the Trigger-Based Discussion-Oriented Continuous Learning Model (TbDoC) will be measured using both qualitative and quantitative methods. Using qualitative methods, feedback from the students will be gathered to gain insights into their experiences and perceptions. This can include student experience interviews. The quantitative methods can include (1) Measuring the cognitive effort required for preparing for the lecture and answering the questions; this can be done through surveys or questionnaires that measure the perceived cognitive effort exerted by students during the preparation phase. (2) Tracking the percentage of students who actively prepared for the lecture; this can be done by inserting within the email a link to the questions, rather than providing the questions themselves in the email, and tracking the number of students who clicked on the link, providing an indication of the level of engagement with the trigger. (3) Evaluating the level of student engagement during the lecture session; various metrics can be employed, such as tracking the frequency and quality of student contributions, monitoring participation rates, or employing observation techniques to measure active engagement during discussions; the possible observation techniques can include video recording the lecture, audio recording the lecture, or direct observation and note taking.

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