

Edmodo as a 21st Century Learning Tool to Enhance 4C Skills of Malay Language Management Undergraduates

Farah Mohamad Zain*, Zamimah Osman, Marini Kasim, Nur Hafizah Ismail, and Faizahani Ab Rahman

Abstract—This study aimed to identify the level of 4C under the 21st century learning skills and to determine the impact of Edmodo's application in enhancing 4C skills. A total of 15 Malay Language Management undergraduate students were selected as respondents for the study, along with the course lecturer and three peer reviews (among lecturers) were also involved in the study. Using qualitative approach, this study employed scholarship of teaching and learning (SoTL) research design during lessons in the 14-week semester. As reflection is the main element of SoTL, a thematic analysis was used to analyze data from the students, course lecturer and peer reviews reflections together with focus group interview. The preliminary findings illustrated that the level of 4C skills among undergraduate students are very weak. However, with intervention implemented by the course lecturer through Edmodo, students have managed to improve their level of 4C skills. From the reflections that reflect positive impact towards the usage of Edmodo, it was found that students were able to boost self-confidence, deliver relevant opinions, generate new ideas upon thinking critically and actively participate in the discussion. This study clearly indicates that the Edmodo is an effective alternative tool for educators to enhance 4C skills among students.

Index Terms—4C skills, 21st century learning, Edmodo, students

I. INTRODUCTION

The e-learning platform in Malaysia, launched in 2011 for both the public and the private higher learning institutions, was one of the initiatives proposed by the Malaysian government as a measure to produce graduates who are competitive, creative, responsible, liberal, independent as well as globally competitive. The initiative was initially one of the Critical Action Projects under the Strategic Plan of Higher Education and is now replaced with the Malaysian Education Blueprint 2015–2025 (Higher Education). The Malaysian Education Blueprint has listed ten education transformation shifts with the ninth shift emphasizes on a globalized online learning.

The 21st century learning which is parallel with the Malaysian Education Blueprint intends to generate a holistic human capital focusing on the 4C skills, namely collaboration, creativity, critical thinking and communication [1]. The 21st century learning is not merely directed to students but is also pivotal for educators to face

the apparent fast-pacing technological era. The utilization of technology that acts as a primary network of information retrieval and gathering knowledge reveals a manifold of implications in the field of education [2]. The breeding of Web 2.0 such as Wikipedia, Facebook and so on is a great platform for students to gain information for learning. Moreover, they are also able to exchange and discuss ideas and insights with others as they seek knowledge. Simultaneously, educators would also benefit from using technology and it allows them to operate on learning application such as Edmodo to deliver information during the learning process. This indicates that technology allows learning process to be ubiquitously available at all times [3].

The integration of technology can be customized to ease the teaching and learning mechanism and processes. In light of the Malay Language Management course (SBLM1053), the 21st century learning element has been exercised correspondingly. This course is offered as an elective or an open elective and through this course that emphasizes on language mastery and communication in various fields of organization, students learn to be competent and efficient managers. At the end of the course, students will be able to administer Malay Language effectively using various different approaches with the stakeholders.

In line with the development of the 21st century, students should not only master the core subjects, but they also ought to know how to apply the knowledge and skills using critical thinking, adapting the knowledge gained in handling a new scenario, analyzing facts, comprehending a novel idea, communicating, working in a team, solving problem and making decisions [4].

Based on the observation of the course lecturer during the teaching sessions, it is obvious that the students who are undertaking the course were noted to be indeed passive and has poor soft skills especially the 4C skills. The issues regarding the 4C include:

- Students either have low confidence in communicating with the lecturer as well as their classmates and often, only a one-way communication takes place in discussions (communication skill).
- When students are assigned with a particular task, they fail to demonstrate their creativity in completing the task given and instead would directly be proportional to the instructions which have been conveyed by the lecturer (creativity skill).
- Students scarcely collaborate among each other since they come from a myriad of course backgrounds (collaboration skill).
- Students are unable to give relevant responses to the questions posed by the lecturer that requires for critical thinking skills (critical thinking skill).

The usage of technology in learning facilitates the students

Manuscript received October 6, 2022; revised December 5, 2022; accepted January 28, 2023.

Farah Mohamad Zain, Marini Kasim, and Faizahani Ab Rahman are with School of Education, Universiti Utara Malaysia, 06010, Kedah, Malaysia.

Zamimah Osman is with School of Languages, Civilisation and Philosophy, Universiti Utara Malaysia, 06010 Kedah, Malaysia.

Nur Hafizah Ismail is with School of Economics, Finance and Banking, Universiti Utara Malaysia, 06010 Kedah, Malaysia.

*Correspondence: mz.farah@uum.edu.my (F.M.Z.)

in regard to information search and this augments the efficacy of the learning process as a step to enhance the quality of learning [5, 6]. With that, calls for preparation of teaching materials that are innovative and technology-based to magnify the capacity of teaching operation. Moreover, by exercising innovative cum tech-savvy teaching aids, a learning atmosphere that is captivating, nurturing, motivating, reduced dependence and easy to learn can be fabricated [7, 8]. Edmodo, a web-based learning applicable as 21st century learning tool to increase motivation [9], performance [9], attitude [10, 11] and learning engagement [11]. However, research on the usage of Edmodo in increasing 4C skills specifically for Malay Language is still very scarce. This sprouts a few questions as follows:

- 1) What is the level of the 4C skills among the undergraduates' students before exposed to Edmodo?
- 2) To what extent does Edmodo contribute to the increase of 4C skills among Malay Language Management course students?

II. LITERATURE REVIEW

A. The 21st Century Learning

Throughout the 20th century, students have been exposed to a learning concept which hinges on reading skills, calculating skills along with writing skills. Due to this, the 20th century students are taught to memorize and grasp concepts merely based on reading and writing [12]. Previously, as a measure to control the classrooms of the 20th century, the students are forbidden from communicating among themselves during the class hour. This has resulted in a boring and passive classroom which in turn has sprouted the interest and dire need to transform teaching to a more of inconducive teaching and learning environment. On the contrary, the 21st century students are encouraged to be actively engaged in the classrooms during the teaching and learning process, that are well-equipped with a large variety of classroom activities. In addition, the classroom activities

are tailored not only based on the reading skills, calculating skills and writing skills, but they also incorporate innovative and engaging classroom activities embedded with the 4C skills [13].

The conventional education system must be upgraded via the intervention of technology [14]. Since the Internet usage has become a widespread across the globe, students have the opportunity to resort to web-based learning [15]. To add on, when the web-based learning is merged with constructive learning approach, the 21st century learning skills among students will be elevated to a much greater height [16].

The 21st century learning can be conceptualized as an education system which underlines students' active response and equips students with thinking skills to ensure that they succeed in this globalized world [17]. To simplify, the 21st century learning accentuates on the teaching approach that highlights the student-centered learning methodology. Basically, the 21st century learning culture addresses the contemporary methods of teaching that suppress the passive attitude and eliminating the spoon-fed style of teaching. On top of that, the 21st century learners are no longer being requested to be quiet and passive in the classrooms, instead they are urged to be more participative, engaged and involved throughout the execution of the teaching and learning process [12]. The 21st century learning also plays a paramount role in stimulating changes in terms of the teaching techniques to prepare the students to be assertive and competent, especially in the fields of their future careers.

B. The 4C Skills (Communication, Creativity, Collaboration & Critical Thinking)

The 4C skills encompasses communication, creativity, collaboration and critical thinking. The activities incorporated by these skills have emerged as the core of the 21st century learning idea, in which the students are even more active in their daily learning process with the utilization of the latest technology such as online learning, social media, digital technology and many more. Table I exhibits an in-depth elucidation pertaining to the 4C skills.

TABLE I: THE 4C SKILLS

Critical Thinking	Critical thinking and innovation encapsulate the students' ability to generate and solve problems as well as complex tasks that have been assigned based on synthesis and analysis of a topic or a learning content [18]. Besides that, students should be able to give a clear explanation pertaining to the learning outcomes of a particular lesson [19]. On the other hand, critical thinking also helps students to catch up other skills such as higher concentration capacity, analytical ability and heightens the thinking process as well [20]. Students will also be able to distinguish information and evidence, evaluate an existing statement, make a precise decision and solve issues by thinking critically [17].
Creativity	Creativity revolves around the various idea generating techniques, detailing, filtration, analysis and gauging idea in order to enhance and maximize the task with more creativity [21]. The students should be guided through to assume that failure is regarded as an opportunity to learn and also comprehend that creativity and innovation is a long-termed and an ongoing cycle, in which a small achievement made with lots of errors is a norm [20]. By the same token, creativity also helps to build a clear imagination of a situation, create a new scenario, come up with alternatives or list down solutions and plan an action as a final touch [22].
Communication	An effective communication aspect is one of the dominant and essential elements in the effort of inculcating the attitude of helping each other among the students as well as foster a strong bond for the birth of a community with good virtues. To add on, communication skills is an ability to express one's thoughts clearly, deliver opinions, give instructions and also motivate others by exercising excellent communicative skills [20]. This communication skills are not only vital in career lives, but also in our day-to-day lives. The ability to communicate uncloudedly during the deliverance of ideas and thoughts can be enacted either orally, written or non-verbally [21]. The effective listening skills also plays a pivotal role in decoding the meaning, knowledge, value, attitude as well as an existing intention. With that, the students will be able to learn something new. Communication skills require the students to be flexible by combining feedbacks effectively; be positive with praises, failures and critics; comprehend, negotiate and balance disagreements and perceptions in order to reach a practical solution in the environment, which is blended in various cultures [21]. The students need to expand their communication skills to exchange information, feelings and meaning via oral messages or written messages [17].

Collaboration

Collaboration can be defined as the occurrence of an active and holistic cooperation between the teacher-student and student-student, which would enable the exchange of ideas and opinions among the students. The students will be skillful in dealing with the others through collaboration. The students will also be able to exchange ideas with their friends in decision-making and conclude unanimously [23]. The students should also be aware of their respective roles, either as a group member or the group leader. With that, they would be able to make decisions in planning a discussion or an activity [24]. The teachers have got to master the collaborative teaching and learning, which conceptualizes the sharing of information between the students and the teacher or the student and the student [25]. The authority is given to the students to determine the objective of a task with the agreement of the teacher to collaborate and discuss in the process of compiling the tasks such as the usage of mind maps, infographics and others [17]. A meaningful learning ought to take place via this method, which is based on the principle of exchanging ideas among the students [26].

The communication skills is focused on the students' abilities to express their flow of thoughts clearly, voice out their opinions, give instructions as well as motivate the other students [27]. On the other hand, the research findings postulates that the critical thinking skills record the lowest score mean as compared to communication skills [28]. Ali [29] elaborates that the learning process that incorporates creativity, collaboration, critical thinking and communication is capable of enhancing the Science skills among the students. Amran and Rosli [30] states that the teachers who emphasizes on the activities that inculcates the Higher Order Thinking Skills paired with the usage of technology in the teaching and learning process can make learning even more creative.

C. Edmodo

Edmodo's pioneers were Jeff O'Hara and Nick Borg where were formed in the year 2008 for the usage of the teachers, the students, the parents, the school and also the higher learning institutions. This application can be accessed at <http://www.edmodo.com> [31]. Edmodo is an educational social network which is considered as a safe learning platform for the students and also the educators as this application enables the teachers to create and manage accounts for their students and students who have received the group code and have registered in the group are able to access and join the group and no anonymous can take part or join the group [32, 33].

The primary difference between Edmodo and other social networks is that this application is a social learning platform for the students, teachers and also the parents to collaborate, communicate, share the contents, get access to the homework and check on the students' grades [34]. Moreover, Edmodo also meets the academic needs, especially for the purpose of evaluation in which the lecturers will be able to give grades, assign tasks and quizzes, make a vote on the poll and also list down the topics for discussion among the students. The students can hand in their assignments, keep track on their grades along with access teachers' comments, receive notifications and collaborate [35]. The lecturers can also form sub-groups in a course in order to adapt the learning in a small group of students [36].

Based on the research findings [37], the research skills of the 21st century students can be upgraded via the usage of Edmodo and the matrix evaluation is apt for the Biology project. The students will have flexible learning hours, both in and out of the classroom [38]. Alqahtani [10] summarizes that the utilization of Edmodo in the pedagogical integration reflects a positive impact towards the academic achievement and motivates the students in the Computer Science course. Ulfa *et al.* [14] expounds that the students who utilize Edmodo in their writing class have a positive perception as they are able to receive feedbacks directly from the teachers,

communicate effectively and undertake different experiences from traditional learning via Edmodo. The teaching process through Edmodo can also increase the attention as well as the attitude towards online learning [10].

III. FRAMEWORK THEORY**A. The Constructivism Theory**

The constructivism theory was established by Jerome Bruner, Jean Piaget and Lev Vygotsky. This theory emphasizes on sociology or antropology, cognitive psychology and education [39] and from the psychological and the philosophical point of view, constructivism refers to the act of either designing or constructing the knowledge which have been learned and digested by the students [40]. Constructivism involves the process of restructuring the contents as well as the essential learning context [41]. The theory of constructivism can be categorized into two main streams, namely the cognitive aspect and the social aspect. Cognitive constructivism refers to knowing and finding out, whereas social constructivism is a situation in which knowledge and experience are shared with the other individuals [42].

The constructivism approach transforms the role of teachers in which, the teacher-centred approach has been shifted to the student-centred learning [43]. In accordance with the ideology of constructivism, knowledge cannot be transferred from teacher to students, but students must build a particular knowledge based on their individual experiences, be it positive or negative [44]. As a measure to help the students to construct a concept or a new knowledge, the teachers should consider existing cognitive structures. When a new piece of information is adjusted and absorbed to be a part of their strong hold, then a new form of knowledge can be constructed [45].

The constructivism approach also demands the students to be independent and active in the process of building self-knowledge. The students should search for the necessary information, discuss with their friends to build new knowledge and generate the knowledge to be more meaningful [44]. The constructivism methodology also presses on the development of student capacity which would help the students to decipher the real-life related issues [46]. Furthermore, this approach also promotes Higher Order Thinking Skills when it comes to problem solving, memory and so on [47].

IV. METHODOLOGY**A. Research Design**

This research was designed in accordance with the framework of the Scholarship of Teaching and Learning (SoTL). Prosser [48] postulated that the SoTL explicates a systematic research approach which is grounded on a critical reflection towards the teaching practice as a measure to complement the effectiveness of the teaching and learning process. Besides that, SoTL also promotes academic to import an authentic approach into the teaching and learning flow in the classrooms and consequently share the research findings along with the other academicians [49]. Therefore, the findings of this research can be evaluated critically by the peers and upgraded to a much better extent in future [50].

B. Sample and Data Collection

This research explores the most appropriate practice in the teaching and learning mechanism. The research involves the course lecturer, lecturers peer review and students. 15 undergraduates of the Malay Language Management course (SBLM1053), who are in their A191 semester for the 2019/2020 session at the School of Language, Civilization and Philosophy, University Utara Malaysia were selected in this research. A course lecturer, with the assistance of three lecturers (peer review) are also indulged in this research.

C. Research Phases

This research envelopes four phases: phase one is identifying the level of 4C skills among the students, phase two briefing on introduction of Edmodo, phase three reflecting on the enhancement of Edmodo usage and phase four evaluating the effectiveness of Edmodo as a step to upgrade the 4C skills.

Phase 1: Identifying the level of 4C skills among the undergraduates' students

This phase was carried out for a duration of two weeks, that is Week 1 and Week 2. In this phase, the course lecturer assigned the students with a group task entitled "The difference between the Pijin language and the Kreol language". The students are required to come up with the presentation slides and presented their task in the classroom. The course lecturer evaluated the students' presentations based on the 4C rubric that encompasses creativity, collaboration, communication and critical thinking. Next, based on observation, the course lecturer executed reflective writing to gauge students 4C level.

Phase 2: Introducing the Edmodo application (Intervention 1)

This phase was conducted for a duration of five weeks, that is week 3, 4, 5, 6 and 7. An intervention is adopted into this second phase, in which the course lecturer introduces the Edmodo application to the students. The students were given a code to register and log in into Edmodo, in which the students are divided into five small groups, that constitutes three students in a group. Each group of students are assigned with a homogeneous task, that is:

- Speech text writing
- Slang language
- Dialect

All the students were required to utilize the Edmodo application thoroughly for the purpose of communication and collaboration. Each group of students should also present their task in congruent with their creativity respectively. The students also need to brainstorm in order to come up with

critical ideas.

The students were requested to present their task in the classroom and the course lecturer with peer reviews conducted the evaluation based on the 4C rubric. After experiencing using Edmodo for five weeks, the students need to write a reflection by referring to the Gibbs Model in which the students had to elucidate the activities that have been carried out, express their feelings throughout the period of working on the Edmodo, analyze whether the usage of Edmodo is able to enhance the 4C skills and finally, list down some suggestions for improvements in the future. The course lecturer and peer review reflection were also required in this phase.

Phase 3: Enhance the usage of Edmodo (Intervention 2)

This phase was conducted for a duration of five weeks, that is week 8, 9, 10, 11 and 12 based on students' reflections, the course lecturer's reflection and the peer reviews' reflections in Phase 2. The course lecturer would guide to students in detail on the use of Edmodo. Next, the course lecturer added postings on the course/task to enable students to give feedbacks since these were used to determine their communication skills, the collaboration skills, the creativity skills and the critical thinking skills. The course lecturer briefed on the criteria for evaluation and provided focused questions to guide the students writing in the Malay Language. These questions play a paramount role to help the students to think creatively and critically. The task given in this phase is "Introduction" and "Preface Writing".

In the twelve weeks, the peer reviews were used to evaluate on the usage of Edmodo in the teaching and learning sessions in the classrooms. Consequently, the peer reviews reflections were created as a result of the observation and the supervision. Apart from this, students also need to do reflection on their experiences using Edmodo.

Phase 4: Evaluation of the effectiveness of the Edmodo in enhancing the 4C skills

This phase was orchestrated in the week 13 and week 14, in which around five students were interviewed via the focus group interview method. The objective of the interview was to triangulate as a step to increase the credibility and the validity of the decision. The triangulation of the data was executed with the collection of three types of data which were reflections, document analysis as well as interviews.

D. Data Collection Procedure and Analysis

The sources of data in this research comprises of an initial survey, student reflection, course lecturer reflection as well as peer review reflection. The data collection task was carried out for 14 weeks. Table II shows data collection procedure and data analysis to achieve research objectives.

TABLE II: DATA COLLECTION AND ANALYSIS

	Data Collection	Data Analysis
	Data was collected from group presentation on Task 1 to analyse the initial level of student's 4C skills.	Analysed using 4C skills rubric to identify the level of 4C skills among undergraduate students.
RQ1	The course lecturer also conducted reflective writing based on his/her observation during presentation and students were completing their tasks.	Course lecturer reflection was analyzed thematically.
RQ2	Data was collected from: (a)students' reflections	Data gathered from reflection and interview

(b)course lecturer reflection
(c)peer review reflection
(d)focus group interview

were analyzed thematically to come up with the contribution of Edmodo in enhancing 4C skills among undergraduate students.

Generally, students were asked to write reflection upon the experience using Edmodo. Examples of the questions to guide students in their reflective writing were:

- (a) To what extent did activities in Edmodo improve your 4C skills (communication, collaboration, creativity & critical thinking)?
- (b) To what extent did activities in Edmodo help you to master the topic?
- (c) How did activities in Edmodo improve your 4C skills (communication, collaboration, creativity & critical thinking)?
- (d) What is your role in this task?

A. RQ1: What Is the level of 4C Skills among the Undergraduates’ Students before Exposed to Edmodo?

The analysis showed that the level of 4C skills among the undergraduates’ students before switching to Edmodo rather weak. The findings were extracted based on the students’ performances in the given group tasks and course lecturer’s reflection.

The rubric was set to cover 4C skills such as i) communication which refers to dynamic and clear delivery of the content, ii) collaboration in which students actively contribute and participate in group discussion, iii) creativity in which ideas/experiences are expressed imaginatively and original, and iv) critical thinking which refers to evaluating and interpreting significance and relevance information needed for the task. There were three levels: low level (mark range 1–3); medium level (mark range 4–6); and high level (marks range 7–10). Table III shows the marks given for the task at the initial stage of learning (ranging from low level (1–3), medium level (4–6) and high level (7–10)

V. FINDINGS

TABLE III: THE MARKS FOR THE 4C SKILLS FOR THE TASK AT INITIAL STAGE OF LEARNING

Groups	Communication	Collaboration	Creativity	Critical Thinking	Total
A	2	2	3	1	8
B	2	1	2	1	6
C	1	1	2	1	5
D	2	1	2	1	6
E	2	1	1	1	5

The analysis of the documents displays that the 4C skills among the students is still at a low level, that is from 1 to 3. The students’ communication and collaboration skills fall between the range mark of 1 to 2 while creativity falls between the range of 1 to 3 marks and critical thinking recorded the lowest mark for all the students, which is only 1.

Based on the marking scheme of the first task that was evaluated by the course lecturer, all the students from the five groups portrayed an extremely low level of critical thinking skills with only 1 mark earned. From the course lecturer’s reflection on the first task, there was a disarray arrangement of ideas and no coherence of ideas in creating a good content. Besides that, the grammar mastery of the students is below par as well. This shows that the application of critical thinking skills in analyzing grammatical errors in sentences is substandard. To exemplify this, the students often make grammatical mistakes, misspelled words and use improper punctuation. In fact, with reference to the first task it is profound that the usage of constructive sentences is not only incorrect, but also limited. To sum up, the language used by the students in compiling their tasks is poor, incoherent. On the other hand, the students did not display the use of critical thinking skills when searching for appropriate references to complete their first assignment. Instead, they only made use of about 1 to 3 reference sources from the journals to compile their tasks. The limited number of reference sources available has resulted in the lack of critical thinking capacity in the students’ assignment contents, which appear uninteresting, inappropriate adaptation of illustrations in the task content and in certain cases, the format and the reference enclosed with the assignment are distorted as well.

In line with the given tasks, the students wrote their responses in a simple sentence form along with the insertion of facts in a structured form. Although this is group task, but

the results do not demonstrate a high level of creativity and critical thinking skills in processing the answers for the compilation of the tasks. Most of the answers given by the students are merely adapted from the notes that has been pre-described by the course lecturer, without making any additional notetaking to give an added value towards their task.

Prior to this, the teaching of the Malay Language Management course (SBML1053) only utilized the traditional approach which was based on face-to-face learning and teaching aids like the power point and the white board along with the pen and the paper. Table IV illustrates the course lecturer’s reflection on the 4C skills of the students for the first task.

TABLE IV: THE COURSE LECTURER’S REFLECTION AT THE INITIAL STAGE

Communication	When the learning session takes place, there is only a one-way communication. The students scarcely elicit any response towards the delivery of the lesson by the lecturer and they are only able to provide short answers that do not meet the requirement of the question which is being asked. Communication among the students is rather fragile, in which the students merely interact with each other when they are being assigned with a group task. Under certain circumstances, one of the students in the group remains isolated by not being engaged in the group discussion and only keeping silence.
Collaboration	The collaboration between the lecturer and the students, it is a daunting task to apply the aspect of collaboration, due to the constraints of the time of meeting, especially of the lecturer and the students. With that, the discussion that is being conducted by the students, cannot be observed by the lecturer. Therefore, the lecturer is unable to assist the students to collaborate in an effective and a meaningful manner.

Creativity	From the aspect of creativity, the students have failed to exhibit their creative skills in structuring their answers and in their write up. Most of the students only answer the questions based on their lecture notes, which have been designed and there has been no initiative that has been undertaken to search for supporting materials to gain more knowledge pertaining to the subject that is being taught. The students are also incapable of thinking out-of-the-box when they are doing their assignments, in which the creative skills in writing are being presented to a lesser degree.
Critical Thinking	As for the critical thinking side, the students have shown a very dissatisfying level of critical thinking skills. For instance, when the lecturer assigns questions related to the current affairs, the students are unable to explain their answers from a critical point of view. This situation is due to the lack of knowledge and exposure to the current happenings, which clearly implies that the students have not been keeping abreast with the importance of gathering information related to the current issues. The students also give spontaneous answers generally without an in-depth elaboration as they are unable to think out-of-the-box critically.

To sum up, the level of the 4C skills among the students is below the margin and this circumstance indicates a call for an intervention to be executed and enhance the level of the 4C skills.

B. To What Extent does Edmodo Contribute to the Increase of 4C Skills among Malay Language Management Course Student?

The course lecturer introduced Edmodo as an intervention to heighten the 4C skills of the students. The following elucidates the enhancement level of the 4C skills among the students which have been analyzed thematically through the students', the course lecturer's and the peer reviews' reflections as well as the focus group interview.

1) Communication

There was an effort to communicate between student-to-student and student-to-lecturer upon the introduction and utilization of the Edmodo which was executed as a medium in the teaching and learning. In line with this effort, three themes have been identified as follows: i) medium of discussion, ii) active learning and iii) boost of self-confidence.

a) Medium of discussion

With reference to the reflection of students, it is rather evident that the students agree that the usage of Edmodo enables them to improve on the communication skills via the group discussion session.

"forum board in Edmodo facilitates students to discuss among themselves in groups or with lecturer, but I am incompetent in utilizing this application. This is because the Edmodo application holds a forum in which group discussions take place." [Student 1].

"...the example of this application enables the students to directly interact with their lecturer via direct message. However, at the initial stage, I was not well-acquainted with the operation of Edmodo, but eventually, this application appears to oil the wheels of the task flow which have been planned by the lecturer." [Student 6]

Edmodo, embedded with a chatting room, advances the communication of the students with the lecturer and also the

other students at any point of time.

"The advantages that underlie the usage of Edmodo is not only time-saving, but also makes it possible for the students to discuss and exchange their opinions among the other students and lecturer via the chatting room. To date, the usage of this application is congruent. Although I have just started to utilize Edmodo, I have the feeling that this application is rather appropriate to be used in the future." [Student 5].

"Aids communication with the lecturer and other course mates via the chatting room pertaining to learning no matter where they are. If there is any question that I do not understand, I have got a platform to clear my doubts as I believe that both my lecturer as well as my course mates will be able to elicit immediate responses to guide me through." [Student 14]

b) Active learning

In consonance with the students' reflections, it has been deduced that an active learning facet takes place upon the discharge of Edmodo. The students are not only able to exchange information by posting in Edmodo, but the other students could also post their comments and also critics. Indirectly, this encourages active learning and also enhances the students' communication skills.

"In my opinion, the pursuit of the Edmodo platform makes it very much easier for me as the application could be accessed via smart phones, in which I can receive replies from my friends. The usage of Edmodo is even more vibrant as my friends will be able to like and comment on the contents that I have posted regarding the assignments, be it an individual task or a group assignment." [Student 7]

c) Boost of self-confidence

According to the peer reviews' reflections, it is found that the usage of Edmodo is able to boost the self-confidence of the students during communication.

"The improvement in the students' communication in which they are more confident to communicate not only among themselves, but also with their course lecturer" [Peer review 1].

From the interview session, it was mentioned that the use of Edmodo enhances the communication skills of the students via forum and also the chatting room. Meanwhile, students C, D and E agreed on the idea that the application of Edmodo has given a hand to the students to present their work in front of all the students in the classroom, having conviction." [Focus group interview]

2) Collaboration

After trained using the Edmodo, the collaboration among the students has shown some improvement. Students work actively with their peers to solve problem [51]. The results based on the students' reflections indicate that the usage of the Edmodo application has not only helped in increasing the collaboration among the students, but timesaving for the students. In addition to that, the discussion sessions were easily carried out and in a relaxed manner. The results of the analysis illustrated that two themes emerged, that is i) student-centered learning and ii) active participation.

a) Student-centred learning

The students' reflections, demonstrate that the student-centered learning succeeded when the student collaborated together to complete the given task. In this

scenario, the lecturer merely plays the role as a facilitator as well as a guide to ensure that the collaboration among the students goes well.

“The Edmodo has made our work much easier in terms of group discussion pertaining to the assignment which has been given by our lecturer. It is also time saving as compared to the other platforms as Edmodo provides a room for a small group forum.” [Student 1].

“Edmodo is also able to foster a collaborative spirit among the course mates in completing the tasks and activities given easily. Be it an individual task or a group work, discussions are administered in a much easier and a relaxed atmosphere via the main Forum.” [Student 3].

“Edmodo is capable of speeding up the collaboration or communication among the students. As a result, each and every individual is facilitated with an easy and a fast communication by downloading the Edmodo in their mobile phones.” [Student 6].

b) Active participation

By referring to the posts that have been received via Edmodo, it is evident that there is an active participation in the students' collaboration in the virtual platform. According to the course lecturer and peer review,

“In light of the collaboration aspect, the involvement of the students, who share their comments via Edmodo, shows a gradual increase. Besides that, the students are also able to create a good relationship among themselves during the advocacy of the group activities.” [Course lecturer].

“The participation of the students in the classroom has become even more active and the students are able to carry out discussions well via Edmodo to compile the given tasks.” [Peer review 2].

“The students A, C and E state that the level of collaboration among the students in accomplishing a group activity task has been swelling incessantly in the wake of the Edmodo usage, whereas the students B and D are agree to the point that the Edmodo has accelerated an active teamwork among the students to complete their task in the virtual room.” [Focus group interview].

3) Creativity

After being exposed to the social learning platform of Edmodo for a duration of ten weeks, it has been spotted that the creativity level of the students has increased tremendously and subsequently three themes have merged, namely i) stimulus of mind, ii) digital skills and iii) outcome of the original assignment.

a) Stimulus of mind

The students' reflections illustrate that the students were able to enhance their creativity by creating postings in Edmodo.

“The usage of Edmodo can also stimulate the minds of the students to discuss about a topic as well as a problem which is being highlighted by the lecturer in which the creativity in the minds of the undergraduates will be reinforced via video sharing in Edmodo.” [Student 3].

b) Digital skills

On top of that, creativity skills also opened the door for the students to explore other skills such as digital skills. By using the Edmodo, the digital skills among the students were being brushed up as they exercise their creativity in terms of

constructing mind maps and linking information.

“The Edmodo has outweighed lots of advantages for me as I am able to learn how to go about this application which indirectly, makes me more skilled and creative indeed through mind maps in handling the latest technology.” [Student 9]

“The student B and C opines that the application of Edmodo is the best stage which gives liberty to the students to generate ideas and pour out their unbeatable creativity in compiling their group task. Moreover, students A, D and E agrees that the creativity among the students can be upgraded via the digital link, which has been provided in the Edmodo application.” [Focus group interview]

c) Outcome of the original assignment

With Edmodo, the students tend to be more creative, able to induce interesting ideas and also deliver intelligible thoughts.

“The growth of creativity among the students is evident through the outcome of the original assignment which has been uploaded in Edmodo.” [Course Lecturer]

“Based on the tasks that has been given, there has been a few student ideas which are rather captivating, coupled with brilliant suggestions.” [Peer review 3]

4) Critical thinking

After the application of Edmodo, a significant increase and change were observed in terms of the critical thinking skills of all the students. Edmodo enables the students to think critically in channeling ideas and additional information which are even more brilliant during the compilation of their assigned tasks. With that, three themes have been scooped, which include i) novel idea, ii) deliverance of rational opinions and iii) thinking out-of-the-box.

a) Novel idea

The students reflected that they are able to generate new ideas upon thinking critically while doing their tasks.

“The usage of Edmodo has showered me with plenty of benefits in which, I am able to think critically and also been spoon-fed with new ideas for me to seek for additional details via the Edmodo forum to get my task done.” [Student 8]

“The Edmodo has also predisposed good traces on any topic that is being discussed via the main web or as a group. This is because the undergraduates are able to think critically via the Edmodo application to compile their tasks.” [Student 9]

b) Deliverance of rational opinions

One of the students elaborates that,

“Edmodo shares information with all the students who are engaged in a classroom. It also enables the participants to convey their individual thoughts respectively in the application, which could directly enhance fair thoughts.” [Student 10]

Through the interview sessions, the students related that the process of compiling a task via Edmodo trains them to become more critical when there is a call to compare and to contrast pieces of information and make evaluation.

“Students A and E are of the same opinion that the application of Edmodo has helped the students to think more critically and be rational in giving ideas on issues pertaining to the current happenings. Even students B, C and D feel that the application of Edmodo has molded their thoughts to be

more critical as well as constructive.” [Focus group interview].

c) Thinking out-of-the-box

After utilizing the Edmodo application in the teaching and learning, there has been a significant increase and a change in terms of critical thinking aspect among the students. In terms of the assignment scoring, majority of the students exhibit a high improvement in their critical thinking skills, where they managed to generate and develop more constructive and substantive ideas “Students can also propel a string of ideas that is intelligible and out-of-the-box.” [Course Lecturer].

VI. DISCUSSION

This study measured the level of the 4C skills and the implementation of Edmodo to enhance 4C skills among the undergraduates of Malay Language Management. Table III displays that the 4C skills among the students is still at a low level before using Edmodo. Although many academics argued the importance of 4C skills as part of teaching and learning, activities or medium of content delivery is not always implemented effectively [51]. Therefore, the Edmodo was introduced as an intervention in improving 4C skills.

Three themes have been identified in communication skill which are medium of discussion, active learning, and boost of self-confidence. Roekel [20] agrees that students who are prudent in communication can undoubtedly express their thoughts either verbally or in written forms clearly. In fact, they are able to deliver their opinions pertaining to the topic of discussion without any difficulties. This is because the students are capable of voicing out their opinions, eliciting instructions and also motivating the other students with their good communication skills [20]. Meanwhile, two themes emerged in collaboration skills which are student-centred learning and active participation. The students were given the authority to collaborate and discuss in getting their tasks done using mind maps, infographics and so on [17]. This notion is supported by the constructivism approach which demands the students to be independent and dynamic in the process of building their own knowledge. In fact, the students should search for the necessary information, engage in discussions with their course mates to construct new knowledge and self-process the information obtained for knowledge enhancement and subsequently make learning more meaningful [44]. Besides that, the outcomes of the interview that was conducted is also in accordance with the finding that the utilization of Edmodo generated an active collaboration among the students. Furthermore, this virtual collaboration has given the means to the students to collate their activities within the stipulated time frame as they are aware of their respective roles, either as group members or as the leader [23]. As a whole, the findings above explicitly substantiate that the implementation of the Edmodo application has successfully enhanced the collaboration level among the students.

For the creativity skill, three themes have been sprouted which are stimulus of mind, digital skills and outcome of the original assignment. The stimulus of mind happens in such that the students are able to imagine a problem clearly, unfold alternatives and finally act as planned [22]. According to Roekel [20], the students should comprehend that creativity

is characterized as a long-term element and the students should be guided throughout, and this is parallel to the 21st century learning culture. This age, digital learning is undoubtedly capable of molding students to become more creative and innovative. The ideas came from the process of detailing information, filtering the information which has been retrieved, conducting an evaluation and eventually producing ideas in a more creative manner [21]. Finally, three themes have emerged for critical thinking skills which include producing novel ideas, presenting rational opinions and thinking out-of-the-box. The students are able to solve problems by incorporating critical thinking skills and creating new ideas as a result of synthesizing and analyzing a particular topic [18]. When the students are capable of thinking critically, they will undeniably present their opinions rationally based on information along with the evidence [17]. As stated by Roekel [20], critical thinking can enhance the students’ thinking skills. Therefore, Edmodo is proven to be able to improve 4C skills among students where the activities given to students would make them be more confident to communicate, collaborate actively, increase creativity and be more critical in problem solving.

VII. CONCLUSION

To conclude, this study has identified two research objectives that are the level of 4C skills among undergraduate students and the contribution of Edmodo that can improve 4C skills. The findings of this research contribute to the knowledge of lecturers to adapt the most applicable teaching methodology via the application of Edmodo. The students have also undergone a constructive learning experience in which they generate new information using collaboration and communication between student-to-student and student-to-lecturer. Furthermore, the outcomes of this research also underline the need for Higher Learning Institutions to implement the application of Edmodo in the teaching design. On top of that, this study also addresses the application of the 4C skills (communication, collaboration, creativity and critical thinking) that act as a cornerstone for the students to embrace the 4.0 Education Revolution. This application also encourages the students to be more creative, communicate actively, think critically and collaborate among themselves. To add on, the application of Edmodo has provided the students to raise a manifold of intelligible ideas during the lecture sessions, voice out critics in the process of creating a much better idea in the task that has been assigned and also compile the given task more effectively. This research upholds the constructivism theory that prioritizes a centralized learning atmosphere in which the students will shoulder the responsibility towards self-learning, whereas the lecturer plays the role of a facilitator to ease the learning process. Finally, the lecturers are suggested to ejaculate some initiatives in empowering intervention of technology to empower the teaching and learning process.

VIII. RECOMMENDATION AND LIMITATION

This research provides better understanding of adopting Edmodo within students of higher education institution in

Malaysia. Future research should attempt a similar study using a larger number of students with different programmes such as Finance, Computer and Law. Besides that, the future research should also investigate Edmodo over a longer period because with more time, additional perceptions and opinions can be obtained from students and instructors. As for practitioners, it is suggested that Edmodo should be adopted within their teaching model to measure the capabilities of virtual learning environments in Malaysia.

Even though the research has provided better understanding of adopting Edmodo as the most applicable teaching methodology, it is important to acknowledge its limitations. This research is limited to a small group of first year students from one specific course only. Indeed, our sample was using a convenient sample, therefore, studies involving a larger and more diversified sample are recommended. Furthermore, this research was conducted for a short duration of one semester only and this calls for a longer duration of research period is needed.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper's publishing.

AUTHOR CONTRIBUTIONS

Farah wrote the conceptualization, design and writing; Zamimah conducted the research; Marini did analyzing data; Nur Hafizah did critical revision and Faizahani did edited and reviewed. All authors had approved the final version.

ACKNOWLEDGEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

- [1] A. R. Ibrahima, Z. Mahamod, and W. M. R. W. Mohammad, "21st century learning and the influence of attitude, motivation and achievements Malay language secondary school student," *Jurnal Pendidikan Bahasa Melayu*, vol. 7, no. 2, pp. 77–88, 2017.
- [2] Z. Mahamod, "Inovasi P dan P: dalam pendidikan Bahasa Melayu," *Universiti Pendidikan Sultan Idris Press*, 2012.
- [3] F. M. Zain, E. Hanafi, Y. Don, M. F. M. Yaakob, and S. N. Sailin, "Investigating student's acceptance of an Edmodo content management system," *International Journal of Instruction*, vol. 12, no. 4, pp. 1–16, 2019.
- [4] M. C. Sahin, "Instructional design principles for 21st century learning skills," *Procedia-Social and Behavioral Sciences*, vol. 1, no. 1, pp. 1464–1468, 2009.
- [5] R. Rahmayanti, "The use of information technology media in learning," *Jurnal Ilmiah Circuit*, vol. 1, no. 1, pp. 93–94, 2015.
- [6] H. M. Hsollah and H. Hassan, "Creating meaningful learning experiences with active, fun and technology elements in the problem-based learning approach and its implications," *Malaysian Journal of Learning and Instruction*, vol. 19, no. 1, pp. 147–181, 2022.
- [7] A. Kusuman, M. Mukhidin, and B. Hasan, "Development of basic subject teaching materials and electrical measurements for vocational high schools," *Jurnal Pendidikan Teknologi dan Kejuruan*, vol. 23, no. 1, pp. 39–45, 2016.
- [8] A. S. Putri and N. Aznam, "The effect of the science web module integrated on batik's local potential towards students' critical thinking and problem solving (thinking skill)," *Journal of Science Learning*, vol. 2, no. 3, pp. 92–96, 2019.
- [9] I. Ryane, "A case study of using Edmodo to enhance computer science learning for engineering students," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 3, pp. 62–73, 2020.
- [10] A. S. Alqahtani, "The use of Edmodo: Its impact on learning and students' attitudes toward it," *Journal of Information Technology Education*, vol. 18, pp. 319–330, 2019.
- [11] B. Y. Cahyono, "Collaborative writing assisted with Edmodo learning management system in Indonesian EFL classes: Learners' attitudes and learning engagement," *Computer-Assisted Language Learning*, vol. 23, no. 2, pp. 108–131, 2022.
- [12] M. Muhamad and G. H. Seng, "Teachers' perspective of 21st century learning skills in Malaysian ESL classrooms," *International Journal of Advanced and Applied Sciences*, vol. 6, no. 10, pp. 32–37, 2019.
- [13] M. Rahman, "Teachers' perceptions and practices of classroom assessment in secondary school science classes in Bangladesh," *International Journal of Science and Research (IJSR)*, vol. 7, no. 6, pp. 254–263, 2018.
- [14] S. M. Ulfa, S. Susanto, and O. Purwati, O, "Beyond the application of Edmodo in classroom: Students' perception and their barriers in the process of utilizing it in writing class," *Jurnal Pendidikan Bahasa Inggris*, vol. 9, no. 1, pp. 96–106, 2020.
- [15] E. Engelbrecht, "Adapting to changing expectations: Postgraduate students' experience of an e-learning tax program," *Computers and Education*, vol. 45, pp. 217–229, 2005.
- [16] M. P. Simanjuntak, N. Marpaung, L. Sinaga, and E. Siagian, "The use of moodle as a learning management system to improve student learning outcomes," *AIP Conference Proceedings*, vol. 2659, no. 1, 140004, 2022.
- [17] H. Bedir, "Pre-service ELT teachers' beliefs and perceptions on the 21st century learning and innovation skills (4Cs)," *Journal of Language and Linguistic Studies*, vol. 15, no. 1, pp. 231–246, 2019.
- [18] J. Ravitz and J. Blazevski, "Assessing the role of online technologies in project-based learning," *Interdisciplinary Journal of Problem-Based Learning*, vol. 8, no. 1, p. 9, 2014.
- [19] S. Prayogi, M. Muhali, S. Yuliyanti, M. Asy'ari, I. Azmi, and N. N. S. P. Verawati, "The effect of presenting anomalous data on improving student's critical thinking ability," *International Journal of Emerging Technologies in Learning*, vol. 14, no. 6, pp. 133–137, 2019.
- [20] D. V. Roekel, "Preparing 21st century students for a global society," *National Education Association*, 2017.
- [21] Partnership for 21st Century Skills. (2010). 21st century knowledge and skills in educator preparation. Tucson AZ. [Online]. Available: http://www.p21.org/storage/documents/aacte_p21_whitepaper2010.pdf
- [22] D. Moseley, V. Baumfield, J. Elliott, M. Gregson, S. Higgins, and J. Miller, "Frameworks for thinking," *Cambridge University Press*, p. 119, 2005.
- [23] M. Kagle, "Professional learning communities for pre-service teachers," *National Teacher Education Journal*, vol. 7, no. 2, pp. 21–25, 2014.
- [24] Z. Q. Liu, E. Dorozhkin, N. Davydova, and N. Sadovnikova, "Co-learning as a new model of learning in a digital environment: Learning effectiveness and collaboration," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 15, no. 13, pp. 34–48, 2020.
- [25] B. H. A. Osman and M. N. Basar, "Penilaian sendiri amalan pengajaran dan pembelajaran abad ke-21 pensyarah Institut pendidikan Guru Kampus Ipoh," *In Conference Paper Keningau*, pp. 1–35, 2015.
- [26] D. W. Johnson and F. P. Johnson, *Joining Together: Group Theory and Group Skills* (11th ed), Allyn and Bacon, 2013.
- [27] E. Y. Leng, "The application of 4C skills and the cultivating of 21st century learning practice in facilitation of form 1 mathematics," *Universiti Teknologi Mara*, 2018.
- [28] M. N. Basar, "21st century teaching and learning practices among lecturers," *Jurnal Penyelidikan Dedikasi*, vol. 10, pp. 1–5, 2016.
- [29] N. M. Ali, "Analysis of the mastery scientific reasoning skills, science process skills and 21st century skills among secondary school in Bachok district, Kelantan," *Universiti Pendidikan Sultan Idris*, 2015.
- [30] N. Amran, and R. Rosli, "Teachers' understanding of 21st century skills," *Universiti Kebangsaan Malaysia*, 2015.
- [31] C. Kongchan, "How a non-digital-native teacher makes use of Edmodo," presented at 5th International Conference ICT for language learning, 2008.
- [32] J. C. Duncan and P. D. Chandler, "A community of practice for early career biology teachers: Social networking and digital technologies," in *Proc. Contemporary Approaches to Research in Mathematics, Science, Health and Environmental Education*, Deakin University, Melbourne Burwood Campus, 2011.
- [33] J. Jarc. (2010). Edmodo—A free, web 2.0 classroom management tool. [Online]. Available: <http://terndingeducation.com/?p=190>
- [34] K. Balasubramanian, V. Jaykumar, and L. N. Fukey, "A study on student preference towards the use of Edmodo as a learning platform to create responsible learning environment," *Procedia - Social and Behavioral Sciences*, vol. 144, pp. 416–422, 2014.
- [35] J. Halm, C. Tullier, A. D'Mello, R. Bartels, A. Wittman, D. Lamboley, and L. Nicholas, "Use of social networking tools in unit 5," *SNT White Paper. Unit 5*, 2012.

- [36] I. Ryane, "A case study of using Edmodo to enhance computer science learning for engineering students," *International Journal of Emerging Technologies in Learning (IJET)*, vol. 15, no. 3, pp. 62–73.
- [37] D. P. Sari, A. R. Wulan, and R. Solihat, "Developing 21st century student research skills through assessment matrix and Edmodo in biology project," *Journal of Physics: Conference Series, IOP Publishing*, vol. 1157, no. 2, 2019.
- [38] B. Prashnig, "Learning styles and personalized teaching," The Continuum International Publishing Group Ltd, 2006.
- [39] S. Hanley, "On constructivism," *NSF Cooperative Agreement*, 1994.
- [40] J. S. Kim, "The effects of a constructivist teaching approach on student academic achievement, self-concept and learning strategies," *Asia Pasific Education Review*, vol. 6, no. 1, pp. 7–19, 2005.
- [41] E. Glasersfeld, *Radical Constructivism*, Routledge, 2013.
- [42] S. C. Yang, "Synergy of constructivism and hypermedia from three constructivist perspectives—social, semiotic, and cognitive," *Journal of Educational Computing Research*, vol. 24, no. 4, pp. 321–361, 2001.
- [43] H. Guo, "Application of a computer-assisted instruction system based on constructivism," *International Journal of Emerging Technologies in Learning*, vol. 13, no. 4, 2018.
- [44] P. Sarita, "Constructivism: A new paradigm in teaching and learning," *International Journal of Academic Research and Development*, vol. 2, no. 4, pp. 183–186, 2017.
- [45] F. A. Mokhtar and H. Dzakiria, "Illuminating the potential of Edmodo as an interactive virtual learning platform for English language learning and teaching," *Malaysian Journal of Distance Education*, vol. 17, no. 1, pp. 83–98, 2015.
- [46] C. Tan, "Constructivism and pedagogical reform in China: Issues and challenges," *Globalisation, Societies and Education*, vol. 15, no. 2, pp. 238–247, 2017.
- [47] R. B. Anwar and D. Rahmawati, "The use of mathematical module based on constructivism approach as media to implant the concept of algebra operation," *International Electronic Journal of Mathematics Education*, vol. 12, no. 3, pp. 579–583, 2017.
- [48] M. Prosser, "The scholarship of teaching and learning: What is it? A personal view," *International Journal for the Scholarship of Teaching & Learning*, vol. 2, no. 2, 2008.
- [49] C. Kreber, "What's it really all about? The scholarship of teaching and learning as an authentic practice," *International Journal Scholarship of Teaching & Learning*, vol. 1, no. 1, 2007.
- [50] L. Schulman, "From Minsk to Pinsk: Why a scholarship of teaching and learning," *Journal of the Scholarship of Teaching and Learning*, vol. 1, no. 1, pp. 48–53, 2001.
- [51] T. Tang, V. Vezzani, and V. Eriksson, "Developing critical thinking, collective creativity skills and problem solving through playful design jams," *Thinking Skills and Creativity*, vol. 37, 2020.

Copyright © 2023 by the authors. This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited ([CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)).