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Impact of Chatbots on Student Learning and Satisfaction in the Entrepreneurship Education Programme in Higher Education Context

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Abstract

There are many ways to learn how to be entrepreneurs and one of the powerful ways is to learn from successful entrepreneurs. However, it is difficult to reach and interview those entrepreneurs about their best practices in doing business in real lives. Chatbot technology can come into play in mimicking conversation of successful entrepreneurs and providing pre-programmed responses of their best practices drawn from interviews published in newspapers, books and articles. Therefore, this research aimed to examine the impact of chatbots in the form of successful entrepreneurs with 24 first-year graduate students, who enrolled in a master's degree of entrepreneurship education at Kasetsart university. Data analysis involved mean, standard deviation, frequency, percentage, and content analysis. The research findings showed that the developed chatbots were appropriate at a very high level (Mean= 4.75, S.D. = 0.22). The impact of chatbots was positive. Students perceived that their learning was better and their satisfaction was at a very high level (Mean = 4.65, S.D. = 0.44) with thoughts that chatbots were an interesting, innovative, and fun teaching way. This study indicated that chatbot technology positively impacted student learning and satisfaction. It can be implemented as a powerful tool to teach entrepreneurship in entrepreneurship education programmes in higher education context.

Keywords: impact, chatbots, student learning, satisfaction, entrepreneurship education

1. Introduction

Entrepreneurs play a key role in promoting economic development. They and their businesses can generate jobs and wealth, which help reduce social and regional inequality (Westhead & Wright, 2013). Entrepreneurial development is expected to boost the economy by creating more jobs and generating new incomes (Song et al., 2021). Teaching entrepreneurship is therefore fundamental for building stronger economy, better income and more flexible societies. As such, it is important to include entrepreneurship teaching in the educational system (Klapper, 2004) due to the fact that entrepreneurship education contributes to the development of business for entrepreneurs (Souitaris et al., 2007).

There are many ways in teaching entrepreneurship and one of the powerful ways is to learn from successful entrepreneurs. Interviewing with entrepreneurs is the learning way used in teaching entrepreneurship (Solomon et al., 2002) and considered as a good starting point to find out what it takes to be successful in businesses. However, it is quite difficult to reach and interview successful entrepreneurs about their best practices in doing business in real lives due to their busy schedules and lack of business network. Chatbot technology can come into play in mimicking human conversation of successful entrepreneurs and providing pre-programmed responses of best practices in doing business drawn from interviews published in newspapers, books and articles, which can be used as learning tasks to teach entrepreneurship and equip students with right knowledge about how to be entrepreneurs from experiences and perspectives of successful entrepreneurs in the form of chatbots like real humans. With chatbot technology, learning entrepreneurship from the best is made possible by turning successful entrepreneurs into chatbots in order that students can learn from the best.

A chatbot (also known as bot) is defined as a software program, which acts like a human when interacted with via message or voice over the internet to simulate a conversation in a scripted way, understand human languages (Xu et al., 2017) and reply to a conversation automatically (Benotti et al., 2014). The requirements of chatbot design include accurate knowledge representation, strategy for answering, and predefined responses to reply when user input is not understood (Augello, Gentile, & Dignum, 2018) or not in a system. Although developing chatbot requires technical expertise (e.g., machine learning and conversation design) that is different from developing

traditional software systems, the use of chatbot framework and platform provided by Microsoft, Facebook, Google and LINE application nowadays makes the chatbot development become much easier (Abdellatif et al., 2020). Two types of chatbots were mostly used. Firstly, a chatbot with pre-programmed answers is called a rule-based chatbot as it is responsible for matching pre-programmed answers with text messages or speeches inputted. It chooses the system response from pre-programmed answers, based on the input text without creating new texts. The responses from the chatbot were coded, organized and presented in the format of conversational patterns. Secondly, a chatbot generating suitable responses is called a machine learning-based chatbot as it is responsible for generating suitable responses drawn from user input via natural language processing and deep machine learning. Therefore, it can generate answers better than the first type, based on user messages because it acts like human by using algorithms of machine learning and techniques of deep learning (Hien et al., 2018). Concerning chatbot design, scalability and usability can be major issues since they have a direct impact on the user experience of a chatbot. Scalability refers to the way a chatbot design handles the increase of users, interactions, and content contained in the chatbot, and usability refers to the actual usability of a chatbot design and if users are able to perform the desired tasks (de Andrade et al., 2022).

Chatbots are useful in applications (Shawar & Atwell, 2007), which can be used as a tool to learn or study a new language, access an information system, visualize the contents of a corpus; and give answers to questions (Bayan, 2005). Benefits involve saving costs, time, and effort (Abdellatif et al., 2020), increasing interaction, active learning, and creative learning (Bii, 2013), promoting retention and engagement (Benotti et al., 2014), motivating students to learn (Benotti et al., 2014), and enhancing user satisfaction (Vanichvasin, 2021).

As a result, chatbot technology has very high potential to use in various contexts. However, there is still limited research on chatbots in education, with most of the research focusing on health and language learning (Nilros & Lidén, 2020). Although chatbots have been tested in education to some extent with language learning being one of the few fields where chatbots have been adopted and widely used (Winkler & Söllner, 2018; Fryer, Nakao, & Thompson, 2019), there are not many chatbots used in higher education context to support students in their learning process. In Thailand, researches were conducted in different contexts such as customer service, medical service, hotel service, tourism and entertainment but there is still limited research in education, especially in teaching and learning. Offering student services by chatbots were most popular topics of research studies. Therefore, this research aims to focus on higher education context with educational intentionality because chatbots can create a learning environment where students use them to increase the quality of learning and provide individual support when the classrooms get bigger and individual support becomes more challenging (Winkler & Söllner, 2018). This study is also built on the researcher's previous research (Vanichvasin, 2021) but with different chatbot framework and platform.

Due to very high potential of chatbot technology and only few studies on chatbots in education in higher education context in Thailand, this research study tends to use chatbot technology to examine the impact of student learning and satisfaction. It is anticipated that the developed chatbots can be used to teach entrepreneurship in entrepreneurship education programme with positive impact of student learning and satisfaction.

2. Literature Review

A chatbot (also known as bot) is defined as a software program, which acts like a human when interacted with via message or voice over the internet to simulate a conversation in a scripted way, understand human languages (Xu et al., 2017) and reply to a conversation automatically (Benotti et al., 2014). The requirements of chatbot design include accurate knowledge representation, strategy for answering, and predefined responses to reply when user input is not understood (Augello, Gentile, & Dignum, 2018) or not in a knowledge base. Although developing chatbot requires technical expertise (e.g., machine learning and conversation design) that is different from developing traditional software systems, the use of chatbot framework and platform provided by Microsoft, Facebook, Google and LINE application nowadays makes the chatbot development become much easier (Abdellatif et al., 2020). Two types of chatbots were mostly used. Firstly, a chatbot with pre-programmed answers is called a rule-based as it is responsible for matching pre-programmed answers with text messages or speeches inputted. It chooses the system response from pre-programmed answers, based on the input text without creating new texts. The responses from the chatbot were coded, organized and presented in the format of conversational patterns. Secondly, a chatbot generating suitable responses is called a machine-learning based chatbot as it is responsible for generating suitable responses drawn from user input via natural language processing and deep machine learning. Therefore, it can generate answers better than the first type, based on user messages because it acts like human by using algorithms of machine learning and techniques of deep learning (Hien et al., 2018). Some chatbot framework and platform operates both types of chatbots.

Concerning chatbot design, scalability and usability can be major issues since they have a direct impact on the user experience of a chatbot. Scalability refers to the way a chatbot design handles the increase of users, interactions, and content contained in the chatbot, and usability refers to the actual usability of a chatbot design and if users are able to perform the desired tasks. For rule-based chatbots, the developer needs to list all possibilities in advance and the chatbot does not work if the input message differs from the predefined patterns, because the generalization is very limited. The conversation context is only understood if the developer programs it directly and objectively. For machine-learning chatbots, they are trained on the datasets called knowledge bases (Agarwal & Wadhwa, 2020). The user does not need to send messages exactly as they are in the knowledge base, because, after training the chatbot, it can generalize new messages. The conversation context is comprehended the same way if the knowledge base contains conversation flows. The course of action is determined based on the probabilities of an incoming message being an intention registered on the knowledge base. The action chosen is the one with the highest probability or none if the probabilities are not high enough (Andrade et al., 2022).

In educational settings, chatbots can be categorized into those with educational intentionality and those without. Chatbots without educational intentionality are used in administrative tasks such as student guidance and assistance (Fernoagă, 2018). Chatbots with educational intentionality are used in fostering teaching and learning. Within this category, there are chatbots, which provide the framework of the learning process, that is, select and arrange contents to fit the students' needs and speed, and help in reflection and learning motivation. These bots act as a learning companion which provides dialogue, collaboration and reflection (Molnár & Szüts, 2018).

Radziwill & Benton (2017) extracted quality attributes from each of the 32 papers and 10 articles, and grouped them based on similarity. After two or three iterations, they noticed that in general, they were aligned with the ISO 9241 concept of usability, that is, 1) effectiveness, 2) efficiency and 3) satisfaction with which specified users achieve specified goals in particular environments (Abran et al., 2003). In particular, effectiveness refers to the accuracy and completeness with which specified users achieve their goals such as performance while efficiency refers to how well resources are applied to achieve those goals such as functionality and humanity (Radziwill & Benton, 2017). Satisfaction refers to affect, ethics and behavior, and accessibility. As a result, effectiveness, efficiency, and satisfaction can be used as a checklist to design, develop, and evaluate chatbots.

3. Theoretical Background

The theoretical background was based from chatbot technology and its quality attributes covering effectiveness, efficiency, and satisfaction. This study was conducted by using chatbot technology and the interaction between chatbots and students in one of the entrepreneurship education programmes in higher education context. The adoption of chatbot technology promoted interaction in 2 ways, that is, through pre-programmed answers (Rule-based chatbot) and suitable answers (Machine-learning based chatbot). Concerning chatbot design, scalability and usability have a direct impact on the user experience of a chatbot. Scalability is how chatbots handle the increase of users, interactions and content contained in chatbots. Usability is how chatbots perform tasks that users desire. In this study, chatbots were designed with scalability to handle users, interaction, and content of best practices from successful entrepreneurs and usability to perform assigned learning tasks. In educational settings, chatbots can be categorized into those with educational intentionality and those without. There were many quality attributes to evaluate chatbots, that is, effectiveness, efficiency, and satisfaction. Prior research findings reported the high impact of learning and satisfaction when using chatbot technology. In this study, Dialogflow was employed as chatbot framework as it operated both types in order to support learning with education intentionality. Student learning and satisfaction were used as learning outcomes. Therefore, student learning and satisfaction were measured to see how chatbot technology supported learning in the selected entrepreneurship education programme in higher education context.

4. Objectives

This study sought to answer two research questions: 1) What do chatbots look like? and 2) How students benefit from the quality attributes of chatbot technology? through the following objectives:

1) To design and develop the chatbots of successful entrepreneurs
2) To examine the impact of the chatbots from student perceptions of learning and satisfaction

This will add to the literature on the impact of using chatbot technology to support teaching and learning in education settings.

5. Method

The researcher used the quasi-experimental research design with mixed methods. The quantitative research was concerned with the applicability of chatbots, and students' perceptions of their satisfaction towards the chatbots.

The qualitative research was concerned with experts' recommendations towards the chatbot improvement, students' perceptions of their learning, and suggestions towards the chatbot technology. The research was conducted in 3 stages: 1) the chatbot and research instrument design, 2) the chatbot and research instrument development, and 3) the chatbot implementation to examine the impact of the chatbots with a reflective journal of student learning and a satisfaction questionnaire.

Stage 1 was concerned with reviewing literature of chatbot technology and studying best practices of successful entrepreneurs from interviews published in newspapers, books and articles in order to use their best practices in designing chatbots and research instruments.

Stage 2 was concerned with the chatbot and research instrument development. Dialogflow was used as chatbot framework with Thai as a main language. LINE application was used as a platform to communicate with students. Interactions with students and content contained in chatbots were designed in the form of questions and answers like interviewing successful entrepreneurs about their best practices in doing business. Then, chatbots were created with educational intentionality to support teaching and learning. Experts evaluated the applicability of chatbots from key elements of chatbot technology. After making changes according to experts' comments, a learning task was assigned to students to ask and interact with chatbots through texts. Default answers were given to continue interviewing when students sent a sticker, an emoji or unmatched texts. The researcher built a knowledge base to contain content of best practices in doing business from successful entrepreneurs. Three different answers were stored in the knowledge base to make chatbots interact like real humans, not repeated answers. Once the knowledge base was completed, the researcher integrated Dialogflow with LINE application and named two chatbots as 1) Masked Entrepreneur and 2) Unmasked entrepreneur. Then, quality attributes were examined. Student learning and satisfaction were selected as quality attributes to measure the impact of chatbots in educational settings. Relevant instruments to measure student learning and satisfaction were developed. Students were encouraged to add two chatbots as friends to Line application and started to interview them about how successful entrepreneurs succeeded in doing their business. After using chatbots, students were distributed a reflective journal and a satisfaction questionnaire in order to measure how chatbots impacted their learning and satisfaction.

Stage 3 was concerned with the chatbot evaluation and verification of relevant research instruments. 3 experts were used in this stage. The pilot study of 20 non-targeted students was also included. Feedbacks from experts and results from the pilot study were collected in order to analyze and use data to improve the chatbots. Next, the chatbots were implemented with 24 first-year graduate students, who enrolled in a master's degree of entrepreneurship education programme at Kasetsart university, to examine the impact of the chatbots on student learning and satisfaction.

5.1 Population and Sampling Procedures

The population was 30 graduate students under business education and entrepreneurship education curriculum at the Faculty of Education, Kasetsart university. Only 24 first-year graduate students, who enrolled in a master's degree of entrepreneurship education programme, were chosen by using a purposive sampling technique as they had to study entrepreneurship under entrepreneurship education curriculum.

5.2 Instruments

Two chatbots were designed and developed to examine the impact of the chatbots on student learning and satisfaction with combination of 3 research instruments, that is, an evaluation questionnaire of the chatbot applicability, a reflective journal of students learning, and a student satisfaction questionnaire. Details were given below.

The researcher designed and developed two chatbots from reviewing the literature of chatbot technology and best practices of successful entrepreneurs drawn from interviews published in newspapers, books and articles. 3 experts used an evaluation questionnaire to examine the chatbot applicability. The pilot study of 20 non-targeted students, was conducted.

The first instrument was an evaluation questionnaire related to the chatbot applicability from the key elements of chatbot technology. It consisted of 3 aspects: content knowledge with 3 statements, content presentation with 4 statements, and benefits of chatbots with 5 statements. Therefore, 12 items of statements with a 5-point Likert scale (from lowest to highest) with 1 open-ended question were generated. The evaluation criteria for average scores (Mean) were set. 4.51-5.00 means highest level. 3.51-4.50 means higher level. 2.51-3.50 means average level. 1.51-2.50 means lower level, and 1.00-1.50 means lowest level. The acceptable level of the chatbot applicability was set at 4.51-5.00. The research instrument was then distributed to 3 experts to seek their opinions

of the chatbot applicability before testing with targeted students. The researcher then reviewed scores results and utilized recommendations to improve the chatbots.

The second instrument was a reflective journal of student learning according to their perceptions in 3 areas, that is, key learning points for success as entrepreneurs, application of key learning points, and reflection on learning. All areas consisted of open-ended questions to identify student learning. The instrument was then distributed to students to check their perceptions of learning from two chatbots. The item-objective congruence (IOC) index ranged between 0.67-1.00 according to experts' opinions.

The third instrument was a satisfaction questionnaire based on using chatbot technology to teach entrepreneurship. It covered 4 areas: content of best practices from successful entrepreneurs with 5 statements, communication about best practices from successful entrepreneurs with 3 statements, application of chatbots as learning tasks to teach entrepreneurship with 4 statements, and benefits of chatbots in teaching entrepreneurship with 5 statements. 17 items of statements with a 5-point Likert scale (from lowest to highest) and 1 open-ended question for students to provide thoughts on the use of chatbots were generated. The evaluation criteria for average scores (Mean) were set. 4.51-5.00 means highest level. 3.51-4.50 means higher level. 2.51-3.50 means average level. 1.51-2.50 means lower level, and 1.00-1.50 means lowest level. The research instrument was then distributed to students to check their perceptions of satisfaction, feedback and comments toward the use of two chatbots. The item-objective congruence (IOC) index ranged between 0.67-1.00 from experts' opinions. The Cronbach Alpha coefficient value was 0.92 from the pilot study of 20 non-targeted students.

5.3 Data Collection

The researcher, as an instructor, asked 3 experts to examine the chatbot applicability and assigned learning tasks to students to interview two successful entrepreneurs in the form of chatbots to find out who they were and what took them to be successful entrepreneurs. Students were asked after completing the learning tasks to reflect on their learning through a reflective journal and rate their satisfaction towards the use of chatbots including feedback and recommendation on their uses. Finally, all instruments were checked for completeness and accuracy before analyzing data.

5.4 Data Analysis

Data were obtained and analyzed from all research instruments, that is, an evaluation questionnaire of the chatbot applicability, a reflective journal of student learning, and a student satisfaction questionnaire. Data of the chatbot applicability, and students' perceptions of their satisfaction were analyzed. A 5-point Likert scale (lowest to highest) was applied to examine the chatbot applicability from experts' opinions and rate the perceptions of satisfaction from students' opinions while data from all open-ended questions were collected to analyze experts' recommendations, students' perceptions of their learning, and suggestions for the use of chatbot technology. All data were analyzed by mean, standard deviation, frequency, percentage, and content analysis.

6. Results and Discussion

The key findings of this research were given below:

6.1 The Chatbot Development

The researcher designed and developed two chatbots from reviewing the literature of chatbot technology and best practices in doing businesses from successful entrepreneurs drawn from interviews published in newspapers, books and articles. Two chatbots were both rule-based and machine learning-based types that generated as suitable responses as possible from the pre-programmed answers with the ability to operate 24 hours while handling all students at the same time. Students could use their own language to communicate with two chatbots and interview as many times as they preferred by typing questions, keywords or texts that they wanted to know via smart phones, tablets or computers.

The chatbots were developed by Dialogflow and implemented on LINE application that students were accustomed to without need to install any extra application. Two chatbots were built, that is, the unmasked entrepreneur and the masked entrepreneur, to act as two successful entrepreneurs and converse with students through texts, pictures and stickers like real humans. Students were assigned a learning task to interview two chatbots of successful entrepreneurs about their best practices in doing businesses; find out who they were, and what it took for them to be successful. Pre-programmed and suitable responses when typing questions, keywords or texts were provided without waiting time. Examples of two chatbots were shown in Figure. 1.

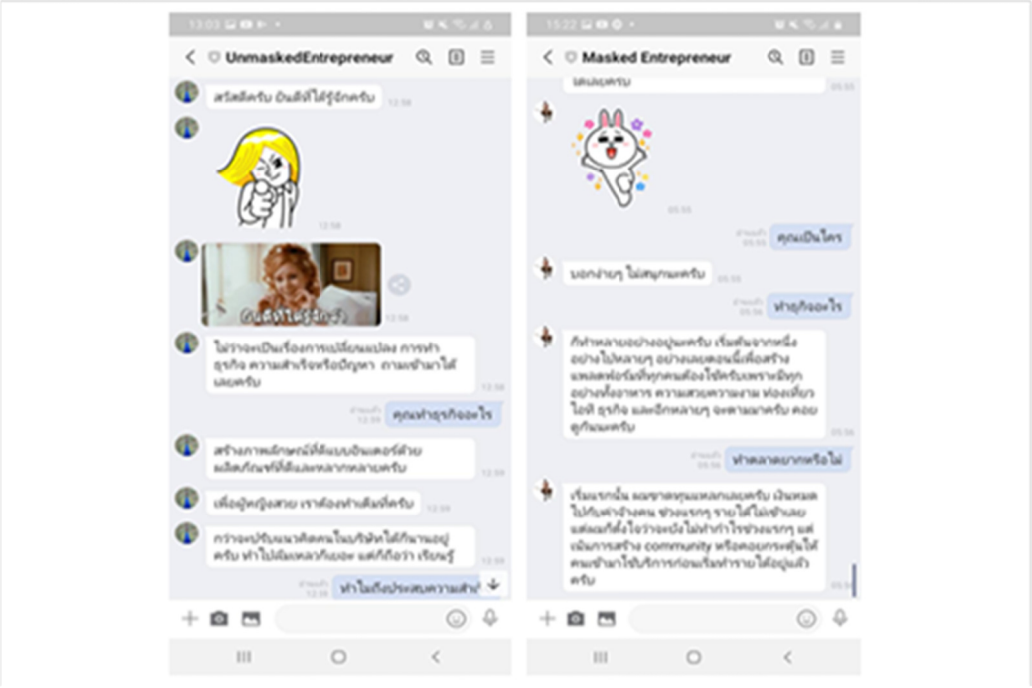

Figure 1. Examples of two chatbots of successful entrepreneurs

3 experts with extensive knowledge and experience in the field of education and technology verified the chatbot applicability and recommended the chatbot improvement. The applicability of chatbots were illustrated in Table 1.

Table 1. Mean & standard deviation of the chatbot applicability

Chatbot Applicability	$\bar{X}$	S.D.	Interpretation
Content Knowledge			
1. Content is relevant to best practices from successful entrepreneurs	5.00	0.00	Very high
2. Content is in the same language students use, which is informal and easy to understand	4.33	0.58	High
3. Content of entrepreneurship is suitable	4.33	0.58	High
Content Presentation			
4. Presentation in the human conversation format	4.67	0.58	Very high
5. Presentation in an interesting format	4.67	0.58	Very high
6. Presentation in a variety of devices	5.00	0.00	Very high
7. Presentation 24 hours	5.00	0.00	Very high
Benefits of Chatbots			
8. Chatbots are easy to use at anytime and anywhere	5.00	0.00	Very high
9. Chatbots can be used many times as preferred	4.67	0.58	Very high
10. Chatbots are a good learning resource of best practices from successful entrepreneurs	4.67	0.58	Very High
11. Chatbots provide responses without waiting time	5.00	0.00	Very high
12. Chatbots inspire students to be entrepreneurs	4.67	0.58	Very High
Total	4.75	0.22	Very high

Table 1 illustrated that the overall average was at a very high level (Mean = 4.75, S.D. = 0.22). In each aspect, the mean and standard deviation of content knowledge, content presentation, and benefits of chatbots were at very high levels (Mean = 4.56, S.D. = 0.38, Mean = 4.83, S.D. = 0.17, Mean = 4.78, S.D. = 0.38, respectively). The experts recommended adding more conversational words to act more like real humans. The researcher made necessary changes to the chatbots from experts' opinions. The chatbots were then pilot tested with 20 non-targeted students. The results were positive with recommendation to add more pictures and stickers to make the chatbots more attractive. Pictures and stickers were added according to the non-targeted students' opinions to improve the chatbots before using with the targeted students.

6.2 Students' Perceptions of Learning

The results of the students' perceptions of learning were demonstrated in Tables 2, 3 and 4. Similar comments by students were summarized. Tables 2, 3 and 4 showed the students' perceptions of learning on key learning points for success as entrepreneurs, application of key learning, and reflection on learning, respectively.

Table 2. Percentage & frequency of key learning points for success as entrepreneurs

Key Learning Points for Success as Entrepreneurs	Frequency	Percentage
1. How to solve problems and make decisions	17	70.83
2. How to create changes with creativity and innovation	13	54.16
3. How to build connection in and outside organization	10	41.66
4. How to improve oneself all the times	6	25.00
5. How to start business with passion	5	20.83
6. How to learn business by doing business	3	12.50

Table 2 showed the key learning points for success as entrepreneurs. 70.83% or 17 students learnt that solving problems and making decisions made entrepreneurs successful. 54.16% or 13 students learnt that creating changes with creativity and innovation made entrepreneurs successful. 41.66% or 10 students learnt that building connection in and outside organizations made entrepreneurs successful. 25.00% or 6 students learnt that improving oneself all the times made entrepreneurs successful. 20.83% or 5 students learnt that starting business with passion made entrepreneurs successful. 12.50% or 3 students learnt that learning by doing made entrepreneurs successful.

Table 3. Percentage & frequency of application of key learning points

Application of Key Learning Points	Frequency	Percentage
1. Taking more reasonable risks to create changes with creativity and innovation	15	62.50
2. Learning from mistakes, problems and decisions	14	58.33
3. Finding what one loves to do	12	50.00
4. Planning business with tools and technology	7	29.16
5. Taking business ideas to actions	5	20.83
6. Looking for networking opportunities	4	16.66

Table 3 showed the application of key learning points. 62.50% or 15 students learnt that they should take more reasonable risks to create changes with creativity and innovation. 58.33% or 14 students learnt that they should learn from mistakes, problems and decisions. 50.00% or 12 students learnt that they should find what they love to do. 29.16% or 7 students learnt that they should plan business with tools and technology. 20.83% or 5 students learnt that they should take business ideas to actions. 16.66% or 4 students learnt that they should look for networking opportunities.

Table 4. Reflection on student learning

Students	Reflection on Learning
Student 1	"I liked it. I felt that I really talked to real entrepreneurs to find out who they were so I had to concentrate and thought carefully what to ask"
Student 2	"I liked it. I needed to plan questions and think carefully on answers received so that I could ask proper questions to find out who were the successful entrepreneurs that I was talking to.
Student 3	"I liked the way chatbots led me to think and analyse identities of entrepreneurs from answers"
Student 4	"I liked learning with fun"
Student 5	"I liked learning that could happen at anytime and anywhere"
Student 6	"I liked learning that was interesting and colourful"
Student 7	"I liked learning through questioning and analysing knowledge gained from answers"
Student 8	"I liked this new way of learning entrepreneurship through chatbots"
Student 9	"I liked it because I had opportunities to practice questioning, thinking, reading, analysing and synthesizing"
Student 10	"I didn't like this way of learning because some answers didn't match my questions"

Student 11	"I liked it because I gained knowledge from questions I asked"
Student 12	"I liked active learning and I thought that I learnt by doing the learning tasks"
Student 13	"I liked it because I learnt instantly and enjoyed my own learning.
Student 14	"I liked it although I found it hard to concentrate on my learning tasks.
Student 15	"I liked learning with no boundaries and freedom to learn the way I questioned"
Student 16	"I liked fast learning that could happen 24 hours"
Student 17	"I liked learning at my convenient time, space, and pace. I also enjoyed answers from questions that I inputted as responses from chatbots were not the same everytime"
Student 18	"I liked this new learning channel"
Student 19	"I didn't like it because chatbots were not real humans that I could meet in person. I knew that I was communicating with a computer programme, not real successful entrepreneurs"
Student 20	"I liked it because it was easy to ask and get answers as many times as possible until I learnt"
Student 21	"I liked it because I had freedom to set my own questions and get only answers that I really wanted to know"
Student 22	"I liked it. Learning was made easy"
Student 23	"I liked it. Learning was made easy"
Student 24	"I liked it. I learnt different perspectives from two successful entrepreneurs in forms of chatbots"

Table 4 showed that a majority of (91.66%) students' perceptions of learning was positive because they liked teaching entrepreneurship with chatbots and thought that chatbot technology highly supported their learning while a minority of (8.34%) students' perceptions of learning did not like teaching entrepreneurship with chatbots because they knew that chatbots they communicated with were not real humans and sometimes gave answers not matched with questions asked.

Based on the results, the impact of chatbots on student learning was very positive. Most students perceived that they learnt better. They felt that they were equipped with right entrepreneurship knowledge to succeed as an entrepreneur.

6.3 Students' Perceptions of Satisfaction

Students were given a satisfaction questionnaire after the completion of the learning tasks to measure satisfaction towards the use of chatbots. Table 5 illustrated students' perceptions of satisfaction.

Table 5. Mean & standard deviation of perceived satisfaction of students

Perceived Satisfaction of Students	$\bar{X}$	S.D.	Interpretation
Content of Best Practices from Successful Entrepreneurs			
1. Content is easy to understand and informal	4.33	0.92	High
2. Content is related to best practices from successful entrepreneurs	4.63	0.58	Very high
3. Content is attractive	4.67	0.56	Very high
4. Content is various	4.63	0.58	Very high
5. Content suits student needs	4.50	0.72	High
Communication of Best Practices from Successful Entrepreneurs			
6. Communication channel to access best practices of successful entrepreneurs	4.67	0.64	Very high
7. Communication of best practices from successful entrepreneurs in the format of conversation	4.54	0.72	Very high
8. Communication can be done as many times as students prefer	4.75	0.44	Very high
Application of chatbots as learning tasks to teach entrepreneurship			
9. Chatbots are easy to use with no extra technical skills	4.75	0.44	Very high
10. Chatbots can be used at anytime and anywhere convenient to students	4.92	0.28	Very high
11. Chatbots can be accessed via any device	4.83	0.38	Very high
12. Chatbots cost no extra expenses	4.96	0.20	Very high
Benefits of chatbots in teaching entrepreneurship			
13. Learning from the best	4.54	0.66	Very high
14. Learning resource of best practices from successful entrepreneurs	4.71	0.55	Very high

15. Motivation to learning	4.58	0.65	Very high
16. Inspiration to be entrepreneurs	4.58	0.65	Very high
17. Practical way to teach entrepreneurship	4.54	0.59	Very high
Total	4.65	0.44	Very high

Table 5 illustrated that the perceived satisfaction towards the chatbot use was at a very high level (Mean = 4.65, S.D. = 0.44). In each area, students perceived satisfaction in content of best practices from successful entrepreneurs, communication of best practices from successful entrepreneurs, application of chatbots as learning tasks to teach entrepreneurship, and benefits of chatbots in teaching entrepreneurship at very high levels (Mean = 4.55, S.D. = 0.56, Mean = 4.65, S.D. = 0.52, Mean = 4.86, S.D. = 0.24, Mean = 4.59, S.D. = 0.55, respectively). Students thought that the chatbots were an interesting, innovative, and fun teaching way with game-like learning tasks to do at anytime, anywhere and many times as they preferred.

The main findings indicated that chatbot technology positively impacted student learning and satisfaction. Results showed that most of students learnt about how to solve problems and make decisions while few students learnt about how to learn business by doing business. Furthermore, most of students wanted to apply their learning by taking more reasonable risks to create changes with creativity and innovation while few students wanted to apply their learning by looking for networking opportunities. Also, most of students felt that chatbot technology supported teaching and learning while few students felt that chatbot technology obstructed teaching and learning because chatbots were not real humans and not able to provide matching answers, which was in accordance with Sandu (2020) who found that biggest concerns for students involved getting incorrect answers by using chatbots. In addition, students were highly satisfied with chatbot technology, which was in accordance with Tavichaiyuth and Rattagan (2021), who reported that some of the most popular and appropriate ways to assess a chatbot's performance are user satisfaction while Chaipram et al. (2020) conducted the satisfaction survey and found out that the chatbot helped students well and students were satisfied with the ease of use the most. Although many useful quality attributes were suggested, there was still no guidance to determine what to apply (Radziwill & Benton, 2017). The lack of reliable and efficient chatbots' evaluation method limits the correct testing and comparison of different models (Caldarini, Jaf, & McGarry, 2022). Apart from that, using Dialogflow as chatbot framework was also one of the reasons leading to learning and satisfaction as previous researches suggested that Dialogflow was outperforming other NLUs in intents classification and entity extraction (Abdellatif et al., 2021). All findings suggested that chatbot technology seemed to have more advantages than disadvantages in supporting teaching and learning if it was properly designed and developed with educational intentionality according to the scalability and usability of chatbots. Therefore, it can be implemented as a powerful tool to teach entrepreneurship in entrepreneurship education programmes in higher education context. The findings were consistent with previous researches. They were in line with Vanichvasin (2021) who found that the application of chatbot technology in education context to promote student knowledge of research yielded positive views of the chatbot as it created positive learning outcomes and provided better individualized learning experience while Winkler and Söllner (2018) reported that chatbots in education promised to have a significant good impact on learning success and satisfaction of students, which was in accordance with Alepsis and Virvou (2011) who reported that their study showed success in the use of conversational systems with high acceptance from both students and teachers that perceived the system as a very useful tool for health education and Preecha (2020) who reported that learning with an artificial intelligence chatbot was efficient as students can quickly find answers anytime and anywhere. Positive impact may stem from the researcher's experience in conducting this kind of research before but with different type of chatbot frameworks and platforms. Also, the ability of chatbots to mimick conversation of successful entrepreneurs like real humans is powerful because chatbots can do a task that would otherwise not be possible or take a longer time (Fryer, Nakao & Thompson, 2019) like interviewing real entrepreneurs, who are difficult to access and interview about their best practices in doing business in real lives. Apart from that, students felt comfortable to interview as many times as possible without worries about using proper or unproper communication to find out what it took to be successful entrepreneurs, which was in accordance with Hill et al. (2015), who analyzed 100 messaging conversations and found that humans carried on significantly longer messaging conversations with the chatbot than with other humans. While each message sent to the chatbot was shorter and the vocabulary not as rich, this finding demonstrated the ease with which humans can communicate with chatbots and the quantity of conversational engagement that was possible. The findings helped instructors gain a better understanding of chatbot technology and provided strong evidence about how to integrate chatbot technology as learning tasks to achieve better student learning and satisfaction.

7. Conclusion and Recommendation

This study was limited using chatbots to perform a learning task and interact with algorithm only in the form of interviewing successful entrepreneurs while there were many types of learning tasks and algorithm that can be used to support teaching and learning. The researcher acknowledged this limitation but strongly believed that the findings would add to the literature on the impact of chatbot technology in 2 areas, that is, how to design and develop a chatbot with educational intentionality according to its scalability and usability to support teaching and learning in educational settings and how students benefited from quality attributes of a chatbot. As a result, the findings reflected that chatbot technology positively impacted student learning and satisfaction. With its high potential, it can be implemented as a powerful tool to teach entrepreneurship in entrepreneurship education programmes in higher education context. Teachers can formulate strategies for using chatbot technology in designing and developing chatbots (rule-based or machine learning based type) to match their learning tasks (interviewing or other possible learning tasks), platform to use (LINE application or other possible platforms) and quality attributes to measure (learning, satisfaction or other possible quality attributes) as the results indicated that students learnt better and satisfied more with this technology. It is hoped that chatbot technology will be extensively used in education settings with educational intentionality due to its' positive impact on student learning and satisfaction. However, the current study used a small sample size and only focused in the entrepreneurship education programme. Therefore, it is anticipated that the next study may use a large sample size and apply chatbots in other education programmes that there is entrepreneurship teaching in the programmes to further investigate learning outcomes with a broader extent in chatbot technology and different programmes in higher education context for more insights in order to establish best practices of teaching entrepreneurship. In addition, the negative impact may be considered in future studies to find out problems in using chatbot technology for better design and development although the research objectives were achieved, there were few students reflecting that chatbots could not perform their functions well enough. As such, algorithms for interactions may be revised for better results.

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