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THE MOTIVATION AND EXPERIENCE OF DISTANCE LEARNING ENGINEERING PROGRAMMES STUDENTS: A STUDY OF NON-TRADITIONAL, RETURNING, EVENING, AND ADULT STUDENTS

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ABSTRACT

Undergraduate distance learning-based programmes in the field of engineering have become one of the popular educational qualifications internationally. Besides traditional-age university students, non-traditional, returning, evening, and adult (NTREA) students make up groups of large significant enrolments at many distance learning programmes. This study explored how undergraduate NTREA students enrolled at the undergraduate distance learning engineering programme described their learning experience and why they decided to enroll in the distance learning-based programmes. 28 participants with majors in civil engineering, computer engineering, environmental engineering, chemical engineering, and biomedical engineering were invited for a private online Skype interview for data collection. The results of this research provide direction for NTREA students, university administrators, educational professionals, career counsellors, human resource planners, policymakers, and governmental leaders to reform and improve human resource planning, educational programmes, and even international enrolment schemes through the development of instructional technology and applications.

Contribution/Originality: The study contributes to the existing literature on distance learning education, student satisfaction, and university enrolment management. The primary contribution of this article also provides directions for reform and improve their distance learning education, student engagement, and teaching and learning styles.

1. INTRODUCTION

For centuries, teachers and students have understood that different students and people would have different ways of learning (Simpson, 2018). Teachers always understand that students have different preferences in learning. Such ideas refer to various learning styles based on students' behaviours, thinking, purposes, and preferences. Due to the differences, many schools and universities created self-directed learning, independent learning courses, seminars, conferences, and even one-on-one courses in order to meet the needs of different learners (Simonson *et al.*, 2008). Grasha (1996) indicated that learning styles as individuals' preferences that impact how individuals gain knowledge, information, and behaviours with peers and teachers. Some learners may learn from peers and teachers while some may learn from self-directed instructions.

Although most of the teachers and educators understand different types of teaching and learning strategies and methodologies existed, these strategies and methodologies are usually not implemented appropriately. For more

than a decade, teachers and educators have tried to use many types of teaching and learning strategies and methodologies in their classrooms in order to meet the demands and needs for different learners. However, the implementation still cannot respond to all learning styles of learners with different backgrounds, purposes, and demands. Surprisingly, some teachers and educators argued that a single teaching and learning strategy could respond to the needs of all students in the school environments, including adults, returning, and even distance learning students (Nunan, 2015). The underlying idea is that learners at the distance learning courses and programmes should have the same or similar learning styles as traditional-age students on campus. Some teachers even believed that the teaching and learning styles, ways of interactions, arrangements of peer discussion, and interactions with people, are universal styles which can fit into all categories (Filippello *et al.*, 2019).

Within the past few decades, distance learning has referred to all types of electronic and internet-oriented teaching and learning styles at P-12 and university-level institutions. Currently, higher education institutions and universities provide students with some types of online learning platforms and systems which allow them to attend lessons, discussions, interactions, chats, and video conferences via the internet. Students may access their materials, assignments, discussion topics, and grading from these platforms without any interruptions. In this decade, such distance learning teaching and learning strategies, methodologies, and academic programmes have become one of the most popular ways of learning at the university level (Brown *et al.*, 2015).

Globally, distance learning has become one of the most popular instructional methods, particularly in the case of certain universities that started to provide distance learning engineering programmes during the current decade (Cavus, 2015). Although traditional face-to-face, on-campus programmes are still considered to be the most popular option among non-traditional, returning, evening, and adult (NTREA) students and traditional-age students, enrolment in distance learning programmes has been increasing during the past decades, particularly in the field of engineering education (Safford and Stinton, 2016; Chung *et al.*, 2017; Wong and Chiu, 2019). There are two reasons for the growth of distance learning programmes:

- University faculty members employ more instructional technology and applications in their classroom (Yamagata-Lynch *et al.*, 2015).
- The increasing demand for enrolment by students who cannot attend traditional lessons with fixed schedules (Stoessel *et al.*, 2015).

As a result, many universities created both distance and hybrid programmes to meet the demands of prospective students, particularly in the field of engineering education.

Most universities worldwide offer distance learning programmes. In the United States, only 1.6 million students have experienced at least one course at the university level. However, student enrolment had increased to more than 7 million by the end of the 2012 academic year: an increase of over 300%. There is a high probability that the number of enrolments will continue to increase throughout the next decade (Alqurashi, 2017).

As student populations increase dramatically, it is important to understand students' feedback, especially about motivation and learning experience, to improve teaching and learning strategies, and performance. Nowadays, individuals use many types of technical tools, such as mobile phones, social media, and the Internet. However, not all students are familiar with learning platforms and systems because students do not usually have access to such school-oriented systems (Bodily *et al.*, 2019).

Most NTREA students would have received their secondary education via traditional face-to-face methods, which may not have involved instructional technology (Dos Santos, 2019a). However, they would have benefitted from face-to-face instruction, networking with classmates, project-based learning, and in the process even learning to interpret other people's body language, all things that distance learning students miss out on (Palloff and Pratt, 2007).

Distance learning programmes usually involve a significant amount of self-learning materials and expectations, meaning that students who have no previous experience in such a learning environment may face difficulties in their

learning experience, such as lack of direction, low self-efficacy, and a low level of satisfaction (Palloff and Pratt, 2011). Distance learning programmes/instruction may transform how instructors teach, and how students absorb and learn, in much a similar pathway as that of the hybrid learning style. Many studies have focused on students' understanding during distance learning programmes and have indicated that students gave mainly positive feedback regarding technical and instructional technologies, distance learning models, and flexibility (Johnson and Aragon, 2003). A study indicated that students' understanding of technology and self-directed skills. The study indicated that students who have self-management skills (i.e. study skills, self-paced learning, self-learning direction, and library skills) and effective time management ability (i.e. goal setting, deadline management, balance between leisure and study) were more likely to complete their programmes (Kim *et al*., 2009). Another study by Dos Santos (2019b) indicated that due to the pressures of self-directed pathways, distance learning students should have self-discipline and self-motivation skills if they were to continue their programmes (Lou *et al*., 2012).

Another study (Elyakim *et al*., 2019) indicated that students enrolled in distance learning programmes due to convenience and location. Several studies indicated distance learning is one of the best options for parents, on-shirt schedule professionals, and people with various other engagements. In the field of distance learning programmes in engineering, a study (Samuelson and Litzler, 2016) indicated that students from minorities tend to enrol due to gender bias in the male-dominated field of engineering. Therefore, distance learning engineering programmes provide maximum flexibility and convenience for students in various scenarios.

Student satisfaction (Dos Santos, 2019b) is one of the most challenging problems and topics for both P-12 and university administrators and leaders. For distance learning programmes, due to the absence of interactions and engagements with teachers and peers on campus, increasing the satisfaction of distance learning students would be more challenging. For further improvements, student satisfaction with distance learning programmes should be understood and researched in order to increase the enrolment and retention and decrease the dropout rate. Studying and understanding student satisfaction always allow P-12 and university administrators and leaders to indicate fields for reforms, improvements, and redesigns. Some researchers also studied the elements that positively and negatively impact student satisfaction of distance learning programmes internationally. Most of the research indicated that without appropriate arrangement and adjusted teaching and learning styles, distance learning students are more likely to drop out from their distance learning programmes (Dos Santos, 2017).

1.1. The Purpose and Significance of the Study

Instead of asking students to attend hybrid lessons, on-campus tutorial lessons and on-site discussions, university departments and instructors can create and update their current curriculum and instructional strategies and technologies which can meet the demands of the busy students, particularly NTREA student populations. Since this study mainly focuses on the issues about NTREA students' understanding and perspective of distance learning engineering courses, there are four significant aspects of the study.

First, NTREA students are one of the most important student populations at colleges and universities. Without the diversity and rich background of peer discussions and knowledge sharing, the classroom environment would be textbook-oriented and theoretical-based. However, increasing the NTREA student populations and increasing the student satisfaction of this NTREA student population would be very important for university leaders and administrators.

Second, over the years, individuals started to form their unique living and studying styles due to the rapid developments of openness and senses of living. During the last century, most of the university students needed to leave their career pathways and developments for university education and graduate school education. However, due to the diverse family backgrounds, living standards, the development of internet and technology, the development of teaching and learning strategies, distance learning, self-paced learning, and even independent learning idea, many busy professionals, single-parents, individuals who live in remote regions, disabled individuals,

and even NTREA student populations can enjoy the benefits of distance learning education. For this study, the direction mainly focuses on the behaviours, experience, and decision-making processes of NTREA students at one of the distance learning engineering undergraduate degree programmes in the United States. Therefore, the exploration and understanding of these participants will be the purview of the literature review.

Third, currently, most of the studies about distance learning programmes mainly focused on the enrolment management, university faculty members' teaching and learning strategies, and the development of the curriculum and instructions from the administrators' perspectives, and only a few studies focused on the experience and decision-making process of NTREA students at the distance learning programmes, particularly the engineering programmes. Therefore, this study would be one of the very few studies to focus on this aspect.

Fourth, although distance learning programmes and courses have become one of the most popular teaching and learning strategies and pathways for learners who cannot attend traditional on-campus courses and tutorials, some universities and departments refuse to offer and develop distance learning programmes for students who cannot engage with the on-campus commitment. Therefore, the researcher would like to use the result to encourage university department heads and university administrators to create some distance learning programmes which can meet the on-going demands of contemporary students internationally.

The purpose of this study is to explore how students describe their distance learning experience and why they decide to enrol in distance learning programmes. The research was guided by two research questions, which were:

- Why do NTREA students decide to enrol in undergraduate distance learning engineering programmes?
- How do NTREA students enrolled in undergraduate distance learning engineering programmes describe their educational experience?

There are three solid reasons why these two research questions can guide this study. First, most of the participants in this study did not experience and try to study any distance learning programmes before university. It is important to understand why they wanted to try a new teaching and learning model for a university degree. After the researcher captured the data information, the findings and results can be useful for other students and learners with a similar background. In this way, more readers and students will be benefitted by the results of this study.

Second, although distance learning programmes are available, many students still prefer on-campus programmes or hybrid programmes which require occasional meetings on-campus. However, the current targeted participants are distance learning learners who do not need to attend any of the on-campus engagements and tutorials. Therefore, the researcher wanted to understand what their reasons and decisions were for not engaging in on-campus meetings.

Third, as many of the participants never tried distance learning programmes before the university enrolment, they should encounter many difficulties and have unique experiences. Therefore, the researcher wanted to capture these opinions for further research.

In conclusion, distance learning programmes in the field of engineering do provide not only the opportunities for students to enjoy and seek education at any time and location internationally but also the opportunities to expand students' horizons without leaving their career pathways and developments. Particularly for NTREA students who usually have various responsibilities and family engagement, the distance learning programmes in the field of engineering allow them to train for registered and practising engineering with their industrial experience at the workplace. Therefore, the results of this study could highly increase the understanding and literature gaps in this area. In addition, university leaders and administrators can understand how to reform and improve their current curriculum and instructions in order to meet the demands and needs of the students' perspectives and feedback.

1.2. Theoretical Framework

The self-efficacy approach guided the direction of this study. The term self-efficacy refers to how individuals' personal beliefs and self-capabilities would impact, organise, and exercise the purposes and goals required to create the given attainments (Bandura and Cervone, 1983; Bandura, 1995). In other words, based on the individuals' self-confidence, how can the individuals complete the assignments, tasks, purposes, and goals? Self-efficacy can impact individuals to become motivated to gain their purposes and goals successfully. Students and learners who have high self-confidence with their personal capabilities should have a higher level of self-efficacy.

For example, in the case of distance learning learners, distance learning learners do not believe the self-directed courses, absence of peer-discussions, and low-level of engagements as several of their life-difficulties to avoid, but instead, these learners take it as life-long achievements to develop their self-esteem and capabilities. As a result, the level of uncertainty and confusion is reduced; and the number of personal achievements, purposes, and goals is increased significantly (Bandura, 1993). However, nowadays, most people may have some experience in the fields of social media, internet, and technology. Although self-regulation and a reasonable level of computer skills are required for distance learning programmes, distance learning students believe other elements, such as self-management, time-management, low-level of engagement, motivation, and interaction are some of the problems for finishing their programmes.

2. METHODOLOGY

A descriptive research design (Merriam, 2009) was used to explore the understanding of current undergraduate students enrolled at the distance learning engineering academic programme(s) at a private university in California, United States. The design allowed the researcher to gain knowledge about the meaning and understanding of why NTREA decided to enrol in undergraduate distance learning engineering programmes and how NTREA students described their educational experience.

The general inductive approach (GIA) was used to analyse the qualitative data information from the interview transcripts (Thomas, 2006). The GIA is a very useful methodology where researchers may use detailed readings and transcripts from the massive data information to derive perspectives, ideas, concepts, and perspectives through interpretations made from the massive data information by an evaluator or research professional. Although there are other methodologies, such as phenomenological analysis, the researcher found that the GIA fits the current research study as the study involved different students from various engineering programmes and geographic regions. Therefore, after the consideration of different elements and factors, the GIA provided the most effective direction for this study.

2.1. Participants and Recruitment

For this qualitative research, the participants in this study consisted of NTREA undergraduate students who participated in a pure distance learning engineering academic programme(s) during the 2018/2019 academic year. The scope of this study involved 28 participants within the disciplines, including.

- Civil engineering.
- Computer engineering.
- Environmental engineering.
- Chemical engineering.
- Biomedical engineering.

Participants needed to meet the following eligibility conditions. Firstly, they must not have received any post-secondary qualifications after their secondary school graduation. Secondly, they must have completed their secondary school education via the traditional route, such as face-to-face on-campus education. Thirdly, they must

be at least 25 years old. Fourthly, they must have been currently enrolled at one of the distance learning programmes in the field of engineering at the targeted private university in California, United States.

As for the recruitment of the participants, these participants were selected with the purposive sampling strategy. The researcher was not a faculty member or administrator of the university and the department. However, due to some research networking and exchanging, the researcher contacted the department administrator for the research interests and research opportunity. As the department head and administrator were keen to reform their current curriculum and instructions for the distance learning engineering programmes, they allowed the researcher to conduct the research with these 28 participants at one of their distance learning programmes.

Secondly, these participants were selected due to their uniqueness of the distance learning programmes. In fact, besides NTREA students, there were still traditional-age and on-campus students who were taking distance learning courses and modules on-top of their on-campus-based programmes. However, these participants were selected as all of them were distance-only students who never experienced on-campus discussions and tutorials. Therefore, the uniqueness of these participants increased the interests and values of this study.

Third, particularly for their NTREA status, currently, most of the higher education administration, student enrolment, and student satisfaction studies and projects mainly focused on the experience and practice of on-campus students where the researchers and school professionals may interact with the participants in person. However, as distance-learning based programmes have developed rapidly during the last decade, the status of NTREA was not investigated and concerned by many professionals in the field. Therefore, the background of this NTREA students was very interesting to many higher education administrators in the field.

2.2. Instrumentation

An email invitation was created and provided online to the department head and administrator for confirmation and further transferred to all students enrolled in the distance learning engineering programmes during the 2018/2019 academic year. Eventually, 28 eligible students agreed to participate.

After the invitation, the researcher received the contact information from their responses and allowed to send the agreement, risk of the study, and semi-structured interview question protocol to each participant via email. The semi-structured and in-depth interview tool (Creswell, 2007) were appropriate because the goals of this research were to look closely at the understanding and experience of distance learning programmes' students in the field of engineering.

Due to the nature of the distance learning orientation, the interview took place online via Skype interview privately. The researcher invited some participants for a face-to-face interview. However, all participants were not living in the same city as the school. Some of the participants were living in some international locations and remote regions. Therefore, the only possible way for data collection was a Skype interview. Each semi-structured interview lasted 40-70 minutes. All conversations were digitally recorded, transcribed, and returned (i.e. member checking) to the participants for validation.

2.3. Protection of Human Subjects

The protection of human subjects was the most important factor in this study due to the nature of distance-based Skype interviews. The first concern was the protection of participants' identities. Therefore, the researcher made every effort to protect the identities of all participants by assigning pseudonyms. The assignment of pseudonyms allows the participants to remain anonymous to potential employers, classmates, teachers, and school administrators.

The second concern was the protection of the university and the programme. Although the researcher gained permission and agreement with the university administrators, departmental leaders, distance learning programme leaders, and the course teachers, the result of this study may negatively impact their enrolments and reputations.

Therefore, the researcher decided to mask all the identities within this distance learning programme and site in order to provide a safe environment.

The third concern was the storage of the collected materials. Besides the digital records from the Skype interviews with each participant, the participants needed to sign paperwork and agreements for this study. Once the participants sent the signed documents to the researcher via email, the researcher would delete the document from his email account for protection.

Finally, all the paper-based and digital-based materials and documents were stored in a password-protected cabinet. Only the researcher had access to the cabinet. Once the interview conversations were marked into word-based transcripts, the name and identities of the participants were removed immediately. After the completion of this study, all the above materials with human identities were destroyed.

2.4. Data Analysis

The researcher first transcribed all the Skype interviews and conversations into word-based transcripts and then thoroughly read each transcript multiple times. Following the steps of the general inductive approach (Thomas, 2006) the transcripts were re-read multiple times as prescribed by the theoretical framework.

The researcher employed the open-coding technique to narrow the large-size and uncategorised materials into the first-level themes. Scholar (Thomas, 2006) believed that first-level themes should be categorised into narrowed and concentrated themes for reporting. Therefore, the axial-coding technique was used to reduce the themes and information into further second-level themes. As a result, two themes and seven subthemes were categorised. Figure 1 indicated the data analysis procedure.

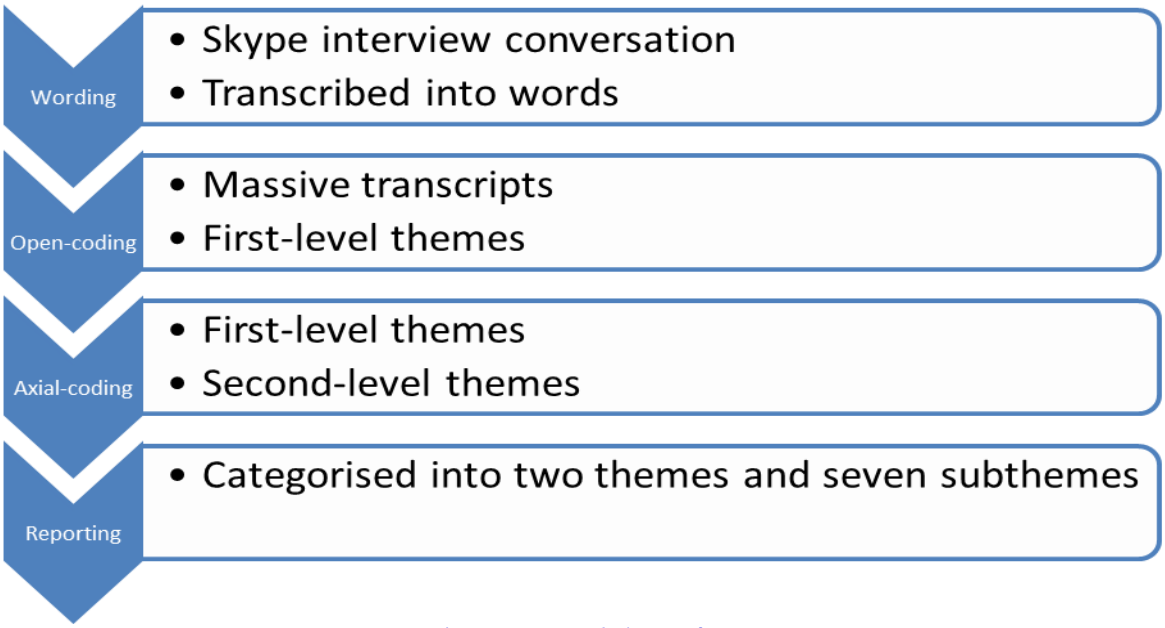

Figure-1. Data analysis procedure.

3. RESULTS AND FINDINGS

After 28 online and face-to-face interview sessions, the researcher analysed the interview transcripts and divided them into meaningful themes and subthemes following the general inductive approach. Through this qualitative inquiry, the researcher was able to conduct an inductive analysis of the data and establish themes to answer the research questions and discuss the results (Creswell, 2012). The analysis of the interviews yielded two themes and seven subthemes, outlined in Table 1. Quotations from interview transcripts supported the findings.

Table-1. Themes and subthemes of the finding.

Themes and Subthemes
Convenience
Time Flexibility
Financial Considerations
Continual Career Development
Self-Learning Experience
Positive: Self-Paced and Self-Controlled Learning Experience
Positive: Discuss With Fellow Peers and Classmates via Learning Platform
Negative: Cannot Enjoy the Benefits On-Campus Students Enjoy

3.1. Convenience

The following part will answer the research questions based on the results and findings. The first theme mainly focused on the goals of the first research question, i.e., why do NTREA students decide to enrol in undergraduate distance learning engineering programmes.

Unlike traditional-age students with no family engagements, immediate career pressures, or responsibilities, NTREA students enrol in distance learning programmes for solid reasons (Safford and Stinton, 2016). Some participants have a related professional experience in the field of engineering while others changed their career to engineering. In expressing this primary theme regarding convenience, participants described how distance learning programmes allowed them to complete their studies without leaving their positions at work. Three subthemes identified within this primary theme were *Time Flexibility*, *Financial Considerations*, and *Continual Career Development*.

3.1.1. Time Flexibility

Most participants were blue-collar workers or housewives who needed to work for a living. Unlike most office workers with fixed working schedules (from early morning to early evening), all expressed that they couldn't attend semester-long courses held at certain times. Therefore, time management and flexible arrangements allowed them to complete assignments and exams in their own time (Safford and Stinton, 2016).

As a participant who works as a full-time fast-food server said: "my schedule changes every other week, I can't even attend any courses at the community colleges…not to mention university…the online degree is my only choice to climb up the ladder…" (Participant #4, Fast Food, Computer Engineering).

A participant who works on construction sites also shared that his working schedule limits his opportunities to attend evening courses at university, saying: "construction jobs are usually hourly jobs…I work one more hour. I receive one more hour's pay…I can't go to school unless they offer late evening courses at 8:00 p.m." (Participant #9, Construction, Civil Engineering).

Besides working schedules and hours, a number of parents also expressed how the flexibility of distance learning programmes allows them to manage career, family, and education simultaneously, allowing them to study with their children at home (Elyakim *et al.*, 2019). A participant said: "I can study engineering and project management textbooks while I am checking my son's mathematics homework." (Participant #11, Housewife, Chemical Engineering). Not only female but also male participants believed that thanks to distance learning programmes they had more time available to spend with their children. One male participant said: "I can work as a father, a student, a husband, and a storyteller with my children. I can gain engineering knowledge in my free time." (Participant #13, Technician, Civil Engineering). In short, distance learning programmes in engineering allow participants to study full-time while also working full-time.

3.1.2. Financial Consideration

Financial considerations were also significant for undergraduate distance learning engineering students. Professional workers with a university qualification usually have a higher salary and better opportunities than workers without a degree, particularly in the field of engineering. Therefore, financial considerations served as one

of the primary reasons for enrolment. All participants expressed their interest in working on their qualification while working full-time. For example, a participant who works at a computer repair factory shared his thoughts: "I do not need to leave my job to study full-time…my current salary covers most of the tuition fees and my living costs…If I were to enrol as a full-time student, I would need to take out a loan…" (Participant #15, System Repair, Computer Engineering). Several participants who were single mothers spoke about their financial arrangements while being enrolled on a distance learning engineering program. One such student said: "I can receive my education while working as a full-time staff member and mother…I saved on transportation fees while being on the programme …" (Participant #16, Cashier, Biomedical Engineering).

3.1.3. Continual Career Development

The idea of continual career development was also shared by all participants. A lot of important feedback, particularly from distance learning students enrolled in engineering programmes, was captured. Firstly, most participants believed that knowledge learnt from textbooks and online courses could transfer immediately into the workplace. As a participant said: "Chemical formulas and statistical knowledge are extremely useful in my department and my position, I can easily apply them on the job…without physically having attended any lessons…" (Participant #18, Lab Assistant, Chemical Engineering).

Secondly, a group of environmental engineering students also stated that engineering management courses allowed them to exercise managerial skills and implement policies in their workplace. One such participant said: "I can apply inter-state and inter-continental ideas and policies in my current workplace…the national park…without leaving the national park for lessons… the balance between work and education is unbelievable..." (Participant #19, National Park Staff, Environmental Engineering).

Thirdly, more than half the students received career promotions after the completion of some stages of their degree. A participant shared that the completion of several of her courses increased her chances for promotion, saying: "I can show my supervisors I gained the knowledge from school, from a self-paced distance learning programme…" (Participant #20, Computer Engineering). Some participants also said that the programmes allowed them to show their multi-tasking abilities. One participant said: "The courses are taught via an online system, so I can tell my supervisors I can handle distance-oriented tasks…" (Participant #21, Computer Engineering).

In short, distance learning programmes in the field of engineering allowed students to continue their daily practices while working toward their degree qualification. Unlike traditional engineering programmes, which required on-campus discussion and projects, distance learning programmes provide the greatest flexibility, financial advancement, and career development. Although distance learning engineering programmes do have some disadvantages, none of the participants expressed significant negativity in the area of convenience. Therefore, it is worth noting that such programmes provide a high level of convenience, satisfaction, and self-efficacy to learners.

3.2. Self-Learning Experience

The following part identified the theme of Self-Learning Experience, which arose mainly from the second research question, which asked how NTREA students enrolled at one of the undergraduate distance learning engineering programmes describe their educational experience and self-efficacy.

Unlike on-campus students and traditional-age students who mainly focus on their studies and learning experience as full-time students, NTREA students usually need to handle at least two additional responsibilities other than their studies. Therefore, their sharing and stories could provide interesting feedback and opinions about how to improve distance learning engineering programmes and courses for students with various backgrounds other than those of traditional-age students. With regards to this primary theme of Self-Learning Experience, participants described their positive and negative experiences as distance learning students in engineering. The three subthemes identified within this primary theme were: (1) *Positive: Self-Paced and Self-Controlled Learning*

Experience, (2) *Positive: Discussions With Fellow Peers and Classmates via Learning Platform*, and (3) *Negative: Cannot Enjoy the Benefits On-Campus Students Enjoy*.

3.2.1. Positive: Self-Paced and Self-Controlled Learning Experience

All participants expressed the advantages of the self-paced and self-controlled learning experience at different levels, with most of the shared stories mainly concerning self-paced learning styles. Firstly, most participants believed some engineering projects required a high level of concentration, which the self-paced learning model enabled, such as in the provision of flexible training. As a participant said: "Most of my statistics courses required timed exams…I can complete my exams on my computer without any interruptions from others…I enjoy the silence…" (Participant #22, IT staff, Computer Engineering).

Secondly, some participants expressed their interest in recorded lessons and videos from their tutors. Some concepts in advanced-level courses are not easy to understand, and students, particularly NTREA students, said that if they can re-read and re-listen to the lessons, it increased their understanding. As one said: "…I am not young, and I cannot understand concepts immediately…I can re-listen to the recorded video as many times as necessary…" (Participant #2, Lab Assistant, Chemical Engineering). Several students also echoed the fact that they could watch recorded videos during breaks. As one said: "I can watch the lessons on the subway, and bus…the classroom is in the palm of my hand…" (Participant #8, IT Staff, Computer Engineering).

3.2.2. Positive: Discussion with Fellow Peers and Classmates via Learning Platform

University education required a lot of peer interaction and discussion to exchange ideas and to brainstorm. Some argued that distance learning programmes eliminated such interaction. However, particularly for engineering and related science courses, the discussion between classmates and instructors can be had via the learning platforms. Firstly, all participants expressed that their engineering programmes required them to respond to their classmates and peers at least four times a week for any specific topic. As one student said: "We need to respond to a certain topic and exchange ideas with peers…our professor responds to us…I can re-read responses multiple times, which is very convenient…" (Participant #1, IT Staff, Computer Engineering).

Secondly, technology-enhanced learning systems allowed students to complete their project-based assignments via online learning platforms. The university introduced a learning system that allowed students to chat, watch, record, transcribe lessons, and drop documents into shared online repositories. As most of the students live in different geographic regions and even time zones, the instructional technology and applications available in their distance learning programmes increased the methods of learning for all students. As one student said, "engineering management required interaction with others…although we cannot meet each other in person, we can meet online via the system. We learned the same knowledge, exchanged similar ideas, and gained the same experience…this is what distance learning should be." (Participant #5, IT Staff, Computer Engineering).

In short, all participants advocated that their distance learning experiences were positive and enjoyable. Most of them learned rich knowledge and built a remarkable relationship with their classmates and instructors via the system without any limitations from their geographic and time-zone differences. The following part outlines some negative experiences shared by the participants.

3.2.3. Negative: Cannot Enjoy the Benefits on-Campus Students Enjoy

Although distance learning engineering programmes provide several benefits to students who cannot attend on-campus lessons, negative feedback was recorded, particularly regarding accommodation and resources. However, such sharing was not significant because most participants acknowledged the arrangements prior to enrolment. Other negative feedback concerned additional fees and access to campus resources, such as gyms. Some complained that they still needed to pay campus fees and administrative fees as distance learning students. As one student said:

"I cannot use any facilities on campus…but I still need to pay maintenance fees." (Participant #28, IT Staff, Computer Engineering). Another group of participants also shared similar feedback. One said: "I cannot go to the gym, so why am I required to pay gym fees?" (Participant #7, IT Staff, Computer Engineering). Nevertheless, some participants understood their responsibilities as members of the university and were willing to pay.

In conclusion, the findings of this research reflect the findings of previous studies dealing mainly with how distance learning students overcome the difficulties and limitations of not being able to attend traditional face-to-face lessons. Distance learning programmes in engineering are not innovative due to the rapid developments in instructional technology and application. The interview transcripts illustrated the experiences of distance learning students who were pursuing their engineering qualification and, in many cases, were both full-time workers and full-time learners.

The researcher also found that even though there is no face-to-face communication, distance learning students arranged and enjoyed their interactions via innovative global learning platforms and systems. All participants advocated that distance learning programmes in engineering allowed them to exercise multi-tasking and online-based performance as potential engineers who can demonstrate their abilities and skills both in the field and online. Interestingly, most participants expressed the sense of self-paced learning and management skills learned from their distance learning experiences and the subsequent career advancement, were remarkable and vital for further development of their working life.

4. DISCUSSION

Unlike other studies (Cavus, 2015) with the general focus on the problems of traditional-age students or students who are enrolling at one of the on-campus programmes in the field of engineering, this study aimed to understand the problems how NTREA students described their distance learning experience, and why they decided to enrol in the distance learning programmes in the field of engineering. When looking at the reasons for enrolling into the distance learning engineering programmes with the lens of self-efficacy, all participants advocated that the engagements and time commitments were their major concerns. Exploring the reasons for their educational experience, the researcher found both positive and negative experience between the self-paced, self-controlled, online discussion with peers and on-campus experience with school staff and instructors.

4.1. Engagements and Self-Efficacy

Time engagements and responsibilities always concern students, particularly NTREA students who usually need to take care of their family, financial considerations and career development. As such, many previous literature advocated that the drop-out rates of NTREA students were relatively higher than traditional-age students due to responsibilities and self-efficacy of degree programme completion.

Firstly, the time flexibility engages NTREA students with family and work responsibilities to complete their degree requirements and coursework assignments under their schedule. Particularly for blue-collar workers and front-line workers who need to work on-shirt, the time flexibility increased their confidence, self-esteem, and self-efficacy as distance learning undergraduate university students (Bandura, 1993;1995). As such, the positive self-efficacy can not only increase the self-confidence and energy to complete their university degree under the distance learning model but can also increase the overall performance the degree programmes and programme reputation.

Secondly, NTREA also believed that financial consideration is their concern for degree completion due to the family and work responsibilities. However, the distance learning programmes and the convenient learning models increased the self-efficacy of NTREA students as it allowed these groups of students to study as part-time learners. Most of the participants advocated that they do not need to worry about the massive loans and financial problems after the completion of their degree programmes. Such financial flexibilities highly increased how students view themselves as distance learning students in the field of engineering (Stoessel *et al.*, 2015).

Thirdly, all participants advocated that the engineering knowledge from their distance learning programmes can be used in their work immediately without any gaps. Unlike traditional on-campus and full-time degree programmes which require students to quit their full-time employments for schools, the distance learning programmes in the field of engineering allowed these potential scientists and engineers to use the textbook knowledge in= practice due to the flexibility. In fact, many students advocated that their personal growth and career promotions were due to the degree programmes. The researcher advocated that the self-efficacy of these groups of students was clear and positive from their understanding and personal lived stories. As such, this positive self-efficacy and self-confidence can not only increase the performance of students but also can prepare them to become effective engineers in the future (Simpson, 2018).

4.2. Learning Styles and Self-Efficacy

It is worth noting that most of the participants had very clear and positive reasons about why they wanted to study at the distance learning programmes in the field of engineering at their university. Under the lens of self-efficacy, participants expressed three main ideas, which were time flexibility, financial considerations, and continual career development. For distance learning programmes, flexibility would be the key to serve these particular groups of learners, especially NTREA students who usually have family and career responsibilities besides their education engagement (Lou *et al.*, 2012).

For the participants in this study, the most critical factor in directing them to enrol at the distance learning programmes in the field of engineering was the unique teaching and learning style of distance learning programmes, particularly how this uniqueness increased their self-efficacy as distance learning undergraduate students. NTREA students, however, have experienced different types of teaching and learning experience from their social experience, working experience, vocational training from their workplace. Although the general education and liberal arts education at the undergraduate level also provides unique and essential improvements for their overall performance, NTREA students usually gained general knowledge from a different perspective. Therefore, in balancing the personal experience and traditional teaching and learning style from the university lessons, NTREA students usually advocated for the self-paced and self-controlled learning experience from the distance learning environment. This can not only increase their overall self-efficacy for completion but also can increase their self-efficacy and self-esteem as distance learning students (Simonson *et al.*, 2008).

It is not hard to believe that some NTREA students may experience a sense of isolation due to the self-paced and self-controlled teaching and learning experience. However, the discussion, peer-interaction, and chat between instructors and classmates eliminated all these limitations from the distance learning perspectives. The learning platform and discussion forum always allow NTREA students to exchange knowledge and ideas from the interactive discussion board online. Although students cannot chat in-person with their peers and instructors, the social media-based chat board does not limit their personal exchanging and chatting. Due to the technological improvements and visual interactions, the self-efficacy of these groups of NTREA students increased dramatically without limitations. For example, a participant advocated that the online discussion board allowed students who were living in the same region to meet up, as said, "our online classmates from the same county can come out for a coffee chat…it only happened last weekend" (Participant #8, IT Staff, Computer Engineering). Therefore, the self-learning experience was not an isolated voyage but an interactive pathway which can engage students from all over the world (Chung *et al.*, 2017).

5. CONCLUSION, IMPLICATIONS AND FUTURE DIRECTIONS

The completion of this research provides three significant insights into engineering education, educational management, human resource shortage in engineering, science education, and educational management. Firstly, the

research outlines the reasons and motivation behind why NTREA students decide to enrol in undergraduate distance learning engineering programmes in the United States.

Although the research was targeted at American engineering programmes, the results may reflect the experience of a large number of colleges and universities that provide similar distance learning engineering programmes internationally. Currently, in the United Kingdom, Canada, and Australia, a number of colleges and universities have started to provide distance learning engineering programmes for their domestic learners who live in remote regions, as well as international students.

Secondly, the research also indicated that time flexibility, financial considerations, and continual career development are three of the significant points which may influence students' choices and selections. Although most students are full-time professionals with family and career responsibilities, most of them can handle being full-time students simultaneously with their working lives and family obligations. More importantly, distance learning engineering programmes allowed them to gain career promotions due to concurrent working and studying arrangements.

Finally, the results of this research provide direction for NTREA students, university administrators, educational professionals, career counsellors, human resource planners, policymakers, and governmental leaders to reform and improve human resource planning, educational programmes, and even international enrolment schemes through the development of instructional technology and applications. Although distance learning engineering programmes are available to all students without any limitations of their background, it is worth noting that distance learning engineering programmes require a significantly high level of self-control, time management, self-regulation, and ability to be self-paced. Students need to understand how to manage the learning styles and deadlines in order to gain positive learning experience and knowledge from such programmes. Nevertheless, students with different backgrounds should gain the essential self-management skills from their university experience and education regardless of the modes (i.e. on-campus or distance learning).

Due to the geographic limitations of this research, future studies may focus on larger populations and university systems that provide similar distance learning engineering programmes internationally. Many international colleges and universities established similar distance learning engineering programmes to provide learning opportunities to students who cannot attend traditional on-campus programmes. The reforms, performance, and evaluation of these programmes are vital. Future research can gather information from other distance learning programmes in other fields, such as biology, computer science, science education, and even liberal arts subjects. This research provides clear directions and blueprints for future researchers within the higher education environment to follow.

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