The Effect of ICT Use on Student Engagement in Moroccan Universities: An Exploratory Qualitative Study

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Abstract— This article presents a qualitative study by Nvivo12 software among students belonging to the different higher education institutions and which [18]. It allows respondents to express their views, opinions and make suggestions [15], in addition, this article examines and explores the engagement of students using ICTE, this will allow us to find out the barrier of ICTE use from the students' point of view in order to present an overview and find out the common variables that need to be addressed carefully.

Keyword— ICTE, UTAUT, University, Engagement.

I. INTRODUCTION

Various technology adoption studies have used the original UTAUT model, while others have also included added constructs to achieve a comprehensive framework for ICTE adoption. In this research, the UTAUT model [18] is used and enhanced to test the impact of adoption and acceptance of ICTE on students. In this paper, we will adopt the UTAUT model [18] to measure the impact of ICTE adoption and acceptance on student engagement, which seems to be the most appropriate model for our research, through a qualitative study with higher education students belonging to different universities.

The conceptual model is integrated in a renewed theoretical perspective. Indeed, it takes into consideration the causal relationship between the three dimensions of acceptance, namely: the intention to use, the use of the technology and the Engagement of the students to it. In addition, the model also incorporates the influence of student sociodemographic characteristics, facilitating conditions, and technology use on the overall acceptance process. UTAUT has advanced research on individual acceptance by unifying theoretical perspectives common to the literature and incorporating four moderators to account for dynamic influences, including gender, age, experience, and voluntary use [19]. It seems reasonable to assume that the UTAUT could be used to study the acceptance and use of information and communication technologies for teaching. We are based on the unified theory to build our model.

Direct determinants of the intention of behavior to use information and communication technology "ICTE" for teaching are included in the model, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. Technology use behavior will be predicted by behavioral intention, and finally the direct determinant of student engagement will be ICTE use behavior. In addition, the model contains four moderating variables that affect the direct determinants: gender, age, experience, and voluntary use. The research model has several constructs the definitions of these constructs are listed in the following table, which presents the different factors studied in related research studies on technology adoption.

TABLE I: Actors Used to Examine the Use of ICT

Construct	Description	Sources
Performance expectation	The extent to which an individual believes that using the system will help him or her achieve gains in job performance	[18]
Effort expectation	The degree of ease associated with using a System	[18]
Social influence	The extent to which an individual perceives that	[18]
Facilitating conditions	Others think he or she should use the new system.	[18]
Behavioral intention	The extent to which an individual believes that	[18] [9]

Finally, based on this literature review, we can propose a first attempt at modeling this research work, presented in the figure below.
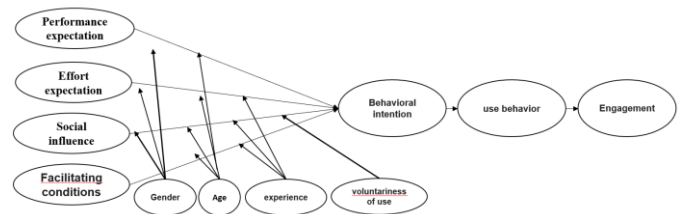

Fig. 1. First Test of the Conceptual Model of the Research

II. RESEARCH METHODOLOGY

The purpose of this exploratory qualitative study is to allow us to propose a conceptual model in the context of Moroccan universities.

According to [12], focus groups generate data that may not emerge in individual interviews or surveys. In addition, the focus group allows us to better understand the opinions, beliefs, and suggestions of the members on the research topic. In this study, the Focus group method was used to gather in-depth information about the concepts of the research model.

The sample of the study consisted of 24 students in different universities that use ICTE services, it is divided on three groups. The focus group consisted of eight members representing different ages, education levels, and jobs.

Before the discussions began, all members were informed about the recording device (digital audio recorder) to help us analyze the discussions. We also informed all participants that the information provided would be used to meet the requirements of the research and that it would be treated in the strictest confidence. The session began with a presentation of background information on the topic and the objectives of the research. Then, an open discussion was held to welcome any questions about the research. We also shared some guidelines to motivate participants to respond during the session. A semi-structured method was used in the discussion in order to not be too detailed and focused on the topic regarding the intention to use ICT services. All members were encouraged to respond freely in their own words to open-ended questions. This took about two hours for each group.

III. RESULTS OF THE STUDY

The statements of the interviewees were processed by a word frequency analysis on the Nvivo 12 software. The purpose of this analysis is to highlight the most important words in the respondents' speeches (table below). Then a textual research analysis on these words was elaborated to extract the synapses that allowed us to understand in which context these concepts were used.

TABLE II: Word Frequency Extract

Variables	Frequency of words relative to model variables	Percentage	Similar words
Intent and usage behavior	138	8,51	using,
Effort expectation	117	7,22	Easy, easy, Facilitating, facilitates, facilitating, Fast, fast, fast, fast, Effective, effective
Engagement	112	6,91	Engaging, engaged, engaging, engaged, engaged, Fun, fun, fun, Experience, experiences, Interactive, interaction, Attentive
Social influence	72	4,44	Student, students, Teachers, Parents, Teachers, friends
Performance expectancy	41	2,53	Useful, useful, usefulness
Facilitating conditions	40	2,47	Knowledge, knowledge, Resource, resources

Source: Word frequency query "NVIVO 12 software

1. The Use of Information and Communication Technologies for Teaching

For the keywords of each variable, the same frequency analysis was performed. Here is a summary that clearly shows that the interviewees are strongly concentrated on the words "usefulness", "easy", "useful", "teacher" and "knowledge".

To further understand the context in which these words were used, we proceeded with a textual analysis using a query via Nvivo12 software. This query allowed us to display the sentences that precede and follow each word.

1.1. Performance Expectations

Respondents were also asked about performance expectations in the Moroccan context. Their views were analyzed by performing the word search, the word "useful" was repeated 41 times with a frequency of 2.53% and which is illustrated in the following figure and describes the views of respondents.

➢ THE WORD « USEFUL»

In this study, performance expectancy is used as the degree to which students believe that using ICT for educational purposes will help them improve their academic performance [17]. The following arguments result from the discussion among the participants:

All participants agreed that the use of ICT for education will definitely improve their performance faster and more effectively.

All participants confirmed that the use of ICT for useful educational purposes will enable students to meet their educational needs more effectively than in the traditional course. ICT allows any user to have access to study service 24 hours a day, 7 days a week without having to come to the universities.

All participants recognized the usefulness of ICTE services in general and mentioned the university's efforts to be part of the global information age. They also expressed appreciation for the university's efforts and tremendous financial support for ICT programs and platforms. These findings are consistent with numerous studies in other developing country contexts that have shown that performance expectancy is a strong predictor of behavioral intention [3].

Based on the above arguments, performance expectancy had a significant influence on behavioral intention (BI) to use ICT services.

TABLE III: Presentation Of "Expected Performance" Verbatims

References	Verbatims
Interview 5 G1	"I would say it's convenient, it helps me get things done faster and for practical reasons".
Interview 2 G2	"Information and communication technology allows any user to access courses 24/7 without having to go to a physical location.
Interview 3 G3	"ICTE puts all students on the same level and guarantees them the full enjoyment of their rights of a good education.
Interview 8 G2	"I used ICTE three years ago, and I found it very useful to avoid travel".
Interview 5 G1	"I have found that ICTE has two advantages: high quality and time saving, so I recommend others to use it".
Interview 8 G2	"I advise everyone to use ICT services and save their time and effort and therefore greater usefulness".

1.2. Effort Expectancy

The frequency of the word "Easy", which is the word most cited by the interviewees and which was repeated 66 times when expressing their expectations of effort towards the use of information and communication technologies for teaching.

➢ THE WORD « EASY »

In this study, effort expectancy is defined as the degree of comfort related to students' use of ICTE [17], the following

arguments reflect the members' observations:

The views in the following table were drawn from the discussion of respondents, all participants expected the use of ICTE to be easy, they said that anyone with a basic understanding of ICTE can easily use University Platform... And all participants agreed that users who are able to use the services of the university platform successfully will be able to easily take advantage of the available services so they agreed that the process of ICTE services is easy to remember, especially through the accumulated use. These findings are in line with the work of [1], [19], [2], which postulate that there are significant differences in the influence of effort expectancy on individuals' willingness to use ICTE associated with age and gender differences

Based on the analysis of the results, the evidence indicates that effort expectancy (EE) positively influences behavioral intention and use of university ICT services.

TABLE IV: Presentation of "Effort Hope" Verbatims

References	Verbatims
Interview 5 G2	"I have been using ICTE since the beginning of the academic year and have found it easy and simple to use, therefore I intend to continue using these services in the future".
Interview 5 G1	"I have been using the ICTE services and I find them easy to learn and use by everyone".
Interview 8 G3	"I have average knowledge of ICT but I have used the ICTE services many times successfully, it was so easy even for inexperienced users".
Interview 3 G2	"Generally anyone with basic knowledge of the internet and computers can easily use ICTE".
Interview 4 G3	"The ease of use of ICT is one of the reasons why I use it."

1.3. Social Influence

Respondents were also asked about the influence of their environment in the Moroccan context in relation to their use of ICT. Their views were analyzed by performing a word search, the word "teacher" was repeated 15 times with a frequency of 0.75%.

➢ THE WORD " PROFESSORS ".

In our study, social influence is defined as the extent to which the student perceives the importance of other people's opinion in believing that she should use ICTE [16], the following arguments are the findings of the discussion among the members:

All participants agreed with the argument that the decision to use ICTE will depend on the opinion of important friends or colleagues and especially their teachers. One participant confirmed that the use of ICT for teaching will depend on their own beliefs and experiences rather than the opinion or viewpoint of those around them except for the opinion of their professor which has a significant influence on their decision to use ICT or watch a MOOC that is related to their traditional course. In general, the participants mentioned that they consult their professor regarding the use of ICTE and then decide whether to use it or not.

In conclusion, the opinions collected by the participants on perceptions of social influence confirmed that social influence seems to be a significant factor on the behavioral intention to use ICTE.

TABLE V: Presentation Des Verbatims « Influence Sociale »

References	Verbatims
Interview 2 G1	"I also think that nothing could be more convincing than friends who are happy with it. It doesn't force me to use them. But if I see that my friends are really happy and satisfied with it, I will use it too.
Interview 1 G1	"I think my likelihood of using it or will change if my colleagues use it.
Interview 2 G3	"If I have a bad recommendation [...], it will create even more barriers for me to use ICT".
Interview 4 G2	"I prefer to just listen to a recommendation from the teachers, on the use of ICTE".
Interview 3 G3	"it is a personal decision and I don't have to follow anyone to accept or ignore it".
Interview 5 G2	"I depend heavily on the experiences of my professors and their recommendations and I fearlessly use any new service provided by our university.
Interview 12 G2	"I used ICTE more than three years ago, during these years I have encouraged my brothers and relatives to use ICTE".
Interview 7 G1	"it is a personal decision and I should not follow anyone to accept or ignore it".
Interview 6 G2	"I would not follow anyone in this era of knowledge and internet I have the ability and resources to find out what is the right and wrong approach, then I will decide what to do and make a selection".
Interview 7 G3	"When one of my friends uses a new technology that usually plays a key role in my decision, especially if they recommend me to use it, I will consider the importance of using it because I trust my friends.

1.4. FACILITATING CONDITIONS
➢ THE WORD "KNOWLEDGE"
➢ THE WORD "RESOURCES"

With regard to facilitating the conditions and availability of resources to support the use of information and communication technologies for education, the comments of the participants are presented as follows: With regard to having the necessary resources to use ICT for educational systems, such as platform computers, access to the Internet ..., which will facilitate and encourage the use of ICT services from anywhere in Morocco, students suggest that university services should be accessible by all and not just students thus including all users, this implies that the educational sectors ensure that services are adapted to new modes of delivery. Participants agreed that the use of ICT services does not require much experience or a high level of education. They believed that the normal user with minimal knowledge of ICT would be able to use ICT services without difficulty.

From the analysis of the results, it is confirmed that facilitating conditions seem to be a significant factor on the behavioral intention to use ICT services.

TABLE VI: Presentation Des Verbatims « Conditions Facilitantes »

References	Verbatims
Interview 1 G2	"I think a lot of students have the knowledge and resources to use ICTE".
Interview 6 G2	"I can access ICTE services anywhere and anytime and I can access easily".
Interview 6 G3	"I have not had any problems with using ICTE, but my teacher will help me if I have any problems".

1.5. Behavioral Intent and Usage Behavior

> The word "USE"

According to the UAUT2 model, the actual use of technology is subject to an individual's interest (behavioral intention) in it. However, it is important to mention here that all participants confirmed that they do not notice any difference between their intention to use ICT and their actual use of it. Therefore, the two concepts of behavioral intention and behavior of using ICT for teaching will be discussed as one concept for these focus groups, all participants recognized the importance and usefulness of ICT and confirmed that they had used it since they entered the university. In addition, they described the advantages and benefits of using ICT services, such as saving time and effort, saving money, increasing their performance, increasing their engagement, increasing their effectiveness of interest. These results agree with those of several authors who have confirmed that behavioral intention is a major determinant of mobile service use and usage behavior as well.

TABL VII: Presentation of "Behavioral Intention and Use Behavior" Verbatims

References	Verbatims
Interview 3 G2	"I was already using ICTE and I can confirm that they provide an excellent service, and a successful experience".
Interview 8 G1	"In the future, I will use all the ICTS services offered by the university".

2. ENGAGEMENT

For the keywords of the engagement variable, a frequency analysis was performed. The summary in the table clearly shows that the interviewees are strongly focused on the words "fun", "experience", and "attentive".

To further understand the context in which these words were used we proceeded with a textual analysis through a query on Nvivo software. This query allowed us to display the sentences that precede and follow each word.

The contextual mentions of "Engagement" by respondents in the context of their uses of ICT services, as determined from a query in the NVIVO software as part of a digital typographic analysis.

> THE WORD « ENGAGEMENT »

Au cours des séances des groupes de discussion, Student engagement emerged as the primary reason why students felt they should use ICTE services, with all participants citing it as an important motivating factor. The results of this study are consistent with previous studies regarding the main factors of student engagement, as student engagement is composed of behavioral, cognitive, and emotional engagement. The fact that the dimensions influence student engagement is important to our understanding of students' learning experiences and, therefore, their success, our results indicate that these feelings are related to the process of using ICTE services. All participants agreed that using university ICT services saves them time and effort, and that they are enjoyable and interesting to use and had confirmed that they were more relaxed and engaged in using ICT for educational services than in the classroom.

It is our impression that the use of a fun use of ICT services was an important factor in the strong affective engagement reported by many participants. The research uses the UTAUT2 model as the theoretical engine for this study, our contribution is to understand the variable "engagement" based on this model, the resulting analyses of our qualitative study confirmed that in the Moroccan context the use of ICT will have an impact on student engagement. Our research model modifies UTAUT2 by including our explanatory variable "engagement". We tested our model on a random sample of 24 students forming 3 focus groups of 8 participants, who belonged to so-called digital universities. These results extend previous research on the multidimensionality of engagement by focusing on multiple dimensions [7], [10].

IV. CONCLUSIONS

The main objective of this study was to shed light on the antecedent variables of ICTE service use and their relationships with student engagement. In general, the results reveal that effort expectancy, performance expectancy, enabling conditions, and social influence, are determinants of students' intention and use of ICTE services, and enabling conditions, and behavioral intention are determinants of ICTE use, finding that behavioral intentions and ICTE use exert an influence on student engagement.

The results of the performance expectation analysis reveal that students will consider using ICTE if its use will improve performance and help them obtain tangible and intangible benefits from its use. In other words, ICTE is seen as a useful strategy and tool from which students can gain benefits, including improving the effectiveness and efficiency of their uses.

The salient impact of expected effort was also validated in the proposed research model, as the focus group members have good prior knowledge of ICTE use and mentioned in their comments the ease of use, so it is easy for potential ICTE users to use these services. Students will consider adopting ICTE if it is easy to use. Thus, the higher the level of ease of use of these services, the more likely students are to use them.

The results also indicate the importance of social influence, students will consider adopting ICTE based on the opinions provided by their significant others and those around them, friends, colleagues, family members, relatives and their teachers. Thus, with a higher level of positive opinions from their social circle, students are more likely to use ICTE services, and vice versa. Regarding the facilitating conditions, this factor was found to be very important in the use of ICTE. It seems that when students perceive that they have adequate knowledge of the service, an adequate tool, and assistance from professors to help them solve the difficulties they encounter when using the services, their intention to use them is enhanced. In fact, if universities show great interest in students' needs, students are more likely to adopt ICTE services.

Then, from the results of the qualitative exploratory study, we can see that two socio-demographic variables were rejected, we are talking about the variable age and the variable experience, from the statements of the interviewees we found

the absence of the moderating role of experience and age between the variables of UTAUT 2 and the intention of the adoption of ICTE by students. In addition, the results showed that the level of study can play a moderating role in the relationship between the explanatory factors of the intention to adopt ICTE and the latter, this is explained by the difference between the level of undergraduate students and master's students.

Finally, we recall that according to the literature review dealt with in this research work, only three dimensions were noted, namely "cognitive Engagement", "affective Engagement" and "behavioral Engagement".

Based on the literature review and the results of our qualitative study we were able to establish our second attempt at enriched conceptual modeling illustrated in the figure below:
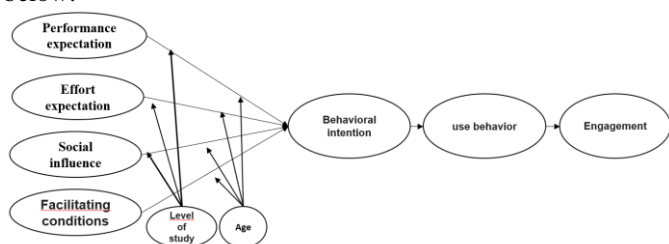

Fig. 2. Essai de modelisation enrichi suite aux resultats de l'etude

Digital transformation is ongoing and far-reaching, with more and more changes in the structures, values and perceptions of society. It is imperative that we first understand what digital transformation means by considering the different perspectives of the concept and its impacts. Beyond understanding, the ability to create solid projections of future developments is crucial for political and business leaders to adapt and focus their research, policy and resource allocation efforts. In this research, we have attempted to address this issue through exploratory and confirmatory study of our structural model. By identifying the context of digital transformation and conceptualizing its dimensions, we created a common rationale and language for leaders within higher education to discuss emerging trends and projections. The results showed the potential for a wide range of topics related to digitalization and digital transformation over the next five years. The greatest attention should be given-as the study's experts agreed-to the societal areas of marketing, industries (etc.), as well as problematic issues such as student behavior, specifically student engagement, this thesis provides implications for policymakers and practitioners within higher education.

This study also contributes to practitioners and will help to overcome the challenges of all those involved in ICT. Traditional learning systems will face more difficulties in maintaining their competitive edge. Practitioners must realize that new technologies will continue to rapidly change the higher education environment [7] [14].

Information and communication technologies for teaching can complement traditional learning methods. The empirical evidence from this study shows that practitioners and leaders within the Ministry of Higher Education and Scientific

Research should focus particularly on effort expectation and hedonic motivation in order to develop their business. They need to be clear about the amount of effort users need to put in to using ICT. Beforehand, potential users need to know that the use of the is easy to learn, clear and understandable, and easy to use. In addition, the implementation of ICT for education should aim to provide pleasure and enjoyment in its use.

It is important to keep in mind the last-mentioned characteristics, teachers should be aware of the need to adapt course offerings to the right audience. Thus, social influence the behavioral decision of users to use information and communication technology for teaching [11], in this sense influencers can be used to spread the word to make a beneficial difference for ICTE adherents.

Another approach is to focus on problem solving. As mentioned in the literature, in order to use new technologies, individuals must change their behavior. Practitioners must consider that potential users are conservative and have ingrained habits [8]. Therefore, acceptance of technologies takes time. Once this behavioral change is accepted, the possibilities that ICTE can offer are limitless. In this case, not only can ICTE complement traditional learning methods, it can even replace them [13]. Practitioners must also consider the transformation of business models used by ICTE. Finally, the use of ICTE is shifting to a subscription-based business model. As a result, the value of price is becoming an important determinant of behavioral intent and, as a result, new managerial implications will arise.

While the education field has not completely neglected the ICTE-related conversation, research is currently lacking. With the results of our study, higher education experts can assess and identify the technologies and factors associated with technology use as well as the dimensions of engagement to focus on. These elements are not necessarily new concepts, but the data on their impact and feasibility are not well researched. This study begins to bridge the conversation with research and, as a result, we hope that it will help many departments and institutions adapt to digitalization by identifying multiple ways in which the use of ICT can be implemented in universities to have increasingly engaged students.

REFERENCES

[1] Abbasi, H. A., Johl, S. K., Shaari, Z. B. H., Moughal, W., Mazhar, M., Musarat, M. A., ... & Borovkov, A. (2021). Consumer Motivation by Using Unified Theory of Acceptance and Use of Technology towards Electric Vehicles. *Sustainability*, *13*(21), 12177.

[2] Abu-Shanab, E., Knight, M. B., & Haddad, M. (2014). Knowledge sharing practices and the learning organization: A study. *IUP Journal of Knowledge Management*, *12*(2).

[3] Adedoja, G., Adelore, O., Egbokhare, F., & Oluleye, A. (2013). Learners' acceptance of the use of mobile phones to deliver tutorials in a distance learning context: A case study at the University of Ibadan. *The African Journal of Information Systems*, *5*(3), 3.

[4] Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). *The business of platforms: Strategy in the age of digital competition, innovation, and power* (pp. 1-309). New York: Harper Business.

[5] El-Masri, M., & Tarhini, A. (2017). Factors affecting the adoption of e-learning systems in Qatar and USA: Extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). *Educational Technology Research and Development*, *65*(3), 743-763.

[6] Engelberg, T., Zakus, D. H., Skinner, J. L., & Campbell, A. (2012). Defining and measuring dimensionality and targets of the Engagement of sport volunteers. *Journal of Sport Management*, *26*(2), 192-205.

[7] Glanville, J. L., & Wildhagen, T. (2007). The measurement of school engagement: Assessing dimensionality and measurement invariance across race and ethnicity. *Educational and Psychological Measurement*, *67*(6), 1019-1041.

[8] Malhotra, A., Malhotra, C. K., & See, A. (2013). How to create brand engagement on Facebook. *MIT Sloan Management Review*, *54*(2), 18-20.

[9] Pavlou, P. A., & Fygenson, M. (2006). Understanding and predicting electronic commerce adoption: An extension of the theory of planned behavior. *MIS quarterly*, 115-143.

[10] Reschly, A. L., Huebner, E. S., Appleton, J. J., & Antaramian, S. (2008). Engagement as flourishing: The contribution of positive emotions and coping to adolescents' engagement at school and with learning. *Psychology in the Schools*, *45*(5), 419-431.

[11] Rochet, J. C., & Tirole, J. (2006). Two-sided markets: a progress report. *The RAND journal of economics*, *37*(3), 645-667.

[12] Sagoe, D. (2012). Precincts and prospects in the use of focus groups in social and behavioral science research. *Qualitative Report*, *17*, 29.

[13] Škrinjarić, B. (2014). William G. Bowen: Higher Education in the Digital Age. *Croatian Economic Survey*, *16*(1), 171-185.

[14] Sun, J., Yan, J., & Zhang, K. Z. (2016). Blockchain-based sharing services: What blockchain technology can contribute to smart cities. *Financial Innovation*, *2*(1), 1-9.

[15] Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS quarterly*, 21-54.

[16] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

[17] Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178.

[18] Venkatesh, V., Thong, J. Y., & Xu, X. (2016). Unified theory of acceptance and use of technology: A synthesis and the road ahead. *Journal of the association for Information Systems*, *17*(5), 328-376.

[19] Wang, Y. S., & Shih, Y. W. (2009). Why do people use information kiosks? A validation of the Unified Theory of Acceptance and Use of Technology. *Government information quarterly*, *26*(1), 158-165.

[20] Wong, K. T., Teo, T., & Russo, S. (2013). Interactive whiteboard acceptance: Applicability of the UTAUT model to student teachers. *The Asia-Pacific Education Researcher*, *22*(1), 1-10.