

Investigating the Relationship between faculty perception of  
educational technology and the level of technology integration into  
teaching and learning

By  
Ahmed I Fallatah

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degree of Doctor of Philosophy.

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Chair: Dr. Yong Zhao

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Dr. Bruce Frey

---

Dr. Suzanne Rice

---

Dr. John L Rury

---

Dr. Robert Isaacson

Date Defended: May 9<sup>th</sup>, 2019

The dissertation committee for Ahmed I Fallatah  
certifies that this is the approved version of the following dissertation:

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Chairperson, Dr. Yong Zhao

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### Abstract

There are three main research goals of this study. The first one is to examine the level of technology integration into teaching by Saudi university faculty members. The second goal of this study is to investigate Saudi university faculty members' perceptions of educational technology. The third and most important one is to investigate whether there is a relationship between faculty perception of educational technology and the level of technology integration into teaching and learning. A quantitative approach was employed to organize, collect, test and analyze the data.

Analysis of self-report survey data from 306 Saudi university faculty members showed that Saudi university faculty members use technology in their teaching at three different levels of the T3 technology integration model; the most used level is the translational level ( $M = 5.35$ ,  $SD = .499$ ), the second most used is the transformational level ( $M = 4.8$ ,  $SD = .84$ ), and the third most used is the transcendent level ( $M = 4.6$ ,  $SD = 1.10$ ).

Five educational technology concepts were examined to investigate Saudi university faculty members' perceptions of educational technology. The overall trend of the findings of this section suggests that there is no definite answer. Therefore, we cannot conclude whether there is misconception or not. For the first four concepts, the mean of the answer centered around 3 (somewhat disagree). Only the fifth concept confirmed a trend toward the disagreement, meaning that there is misconception or misunderstanding about this concept.

Regression analysis found that there is a relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia. By and large, all regression models in this study were statistically significant, indicating that perception concepts are good at predicting the level of technology integration into teaching.

## Dedication

*This study is wholeheartedly dedicated to;*

*My inspiring father and mother, who have been my source of inspiration and who continually provide their moral, spiritual, emotional, and financial support.*

*To my beloved wife Mona whose unconditional encouragement, support and patience made it possible for me to complete my PhD degree. You are my life partner, and I am so thankful we did this together. Thank you for being my wife.*

*To my kids, Azzam, Alaa, and Ghaidaa who have been a source of joy, happiness, and enthusiasm.*

*Also, I would like to dedicate this study to my brother, sisters, nieces, and nephews who supported me in my academic journey.*

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## CHAPTER I: INTRODUCTION

### Introduction

As technology use continues its steady growth in educational practice, educational technology has not yet transformed or fulfilled its full potential to improve education (Bottino, Forcheri, & Molfino, 1998; Ginserb & McCormick 1998; Keengwe, Onchwari, & Wachira, 2008). In other words, Technology has not yet solved many significant educational problems, especially on the large scale (Zhao, Zhang, Lei & Qiu, 2015).

There is a growing concern about the missing benefits of educational technology. For example, on the higher education level, Geoghan (1994) noted that despite the greater availability of technology at reasonable prices, a growing familiarity with technology by faculty, and the large investments in technology for student and faculty use, instructional technology is not being used in the classrooms of higher education at the level of early expectations. Broad, Matthews, & McDonald (2004) argued that higher education is slowly embracing the opportunities that educational technology offers. It is believed that despite the adoption of educational technology in higher education since the mid-1990s, no significant change in learning and teaching has occurred as many had anticipated (Kirkup, Kirkwood, 2005).

There are two issues related to why technology does not improve learning outcomes: the quantity and the quality of technology use (Lei & Zhao, 2007). The quantity of technology use in education deals with how much technology is available in the classrooms and how frequent teachers use those technologies in their instruction. Currently, students and teachers have an adequate access to technology in classrooms, which is attributed to the great investment in online learning and educational technology.

Governments worldwide are investing heavily in online learning and educational technology (Amiel, 2008). In 2003, researchers have estimated that more than 70 billion dollars was spent on educational technology infrastructure and training in the past ten years in the United State alone (Dickard, 2003). In Saudi Arabia, the government has allocated 3.1 billion Saudi Riyals (SAR) to develop the technological and scientific facilities in Saudi universities (27 universities) (Alharthi, Alassafi, Walters, & Wills, 2017). In 2008/2009, UK schools spent £880 million (or 3.2% of overall spend) on educational technology (Livingstone, 2012).

In recent years, the field of education in the United States, Britain, Europe and elsewhere has seen a wide spread of digital and networked technology in the classroom (Rudd et al., 2009; Korte & Husing, 2006; Paige, Hickok, & Patrick, 2004). Interactive whiteboard, virtual learning environment, educational computer games, and educational internet applications are more presently used in classrooms (Sheard & Ahmed, 2007). Generally, the mainstream of literature concerning technology use in education focused on the quantity of technology use (Lei & Zhao 2007).

On the other hand, over the last several years, the quality of technology use has gained more recognition and attention. Educators has recognized or realized that technology does not make difference unless it is utilized properly (Lei & Zhao, 2007). According to King (2002), "The public and educators alike have realized that just having the technology in place does not immediately result in it being used to further educational attainment" (p. 284). Educational technology can be used effectively depending on how it is used, by whom, and for what purposes (Burbules & Calister, 2000). Even though the quantity of technology use has increased, we cannot conclude that the quality of education has improved. Abrahams (2010) stated that "infusion of educational technology on college and university campuses for faculty and student

use does not always result in its successful integration into either instruction or the campus" (p. 35).

Although educational technology is being used in the classroom more frequently than ever, it has not been utilized properly or effectively. Factors leading to such improper use and poor adoption by teachers and faculty members include organization policy and support, time availability, and teachers and faculty preparation. Additionally, many research teams (Blin, Munro, 2008, Keller, 2005, Kirkup, Kirkwood, 2005, Selwyn, 2007, Senik, Broad, 2011, Watty, McKay & Nago, 2016) have reported teachers and faculty personal resistance and personal attitude as fundamental barriers to technology adoption.

Ertmer (2005) argued that teachers and faculty beliefs is the largest barrier to technology integration. Kagan (1992) defined teacher beliefs as "tacit, often unconsciously held assumptions about students, classrooms, and the academic material to be taught" (p. 65). In order to help teachers and faculty use technology to enhance the curriculum, teachers' and faculty' values and beliefs need to be included on conversations on best educational technology practices (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010). Also, it is important to understand the context of technology and education in the large culture including the perceptions of faculty, students, and other stakeholders, and understanding the real reasons for technology use and the lack thereof (Nicolle, 2005).

Zhao (2015) claims that technology has not transformed education due to five educational technology mistaken conceptual approaches that dominated the practice of educational technology field. Technology failed to transform education because of the prevalent mindset of using technology to improve the traditional paradigm of education. In order to use technology to transform education we need to examine the prevalent mindset among faculty members and its

relation to the level of technology integration. Thus, we can answer the question: does perception matter?

### **The purpose and research questions**

The purpose of this study is to examine the level of technology integration into teaching and learning by Saudi university faculty members. Another goal of this study is to investigate Saudi university faculty members' perceptions of educational technology. This study will also investigate whether there is a relationship between faculty perception of educational technology and the level of technology integration into teaching and learning.

### **Significance of the Study**

The dynamic and the growing speed of education technology give educators and researchers limited time to reflect and investigate this technology. That is why we missed the potential power and opportunities of educational technology. Pointing out to educational technology, Zhao (2015.p1) stated, " Every cycle started with amazing euphoria and then ended with disappointing outcomes. But somehow, we managed to forget the failures. We did not even stop to reflect what went wrong because new technology emerged, with more power and thus more hope". Therefore, understanding the faculty perception of educational technology and their technology skills level in relation to technology integration would be an important step in the right direction to successfully integrate technology into instruction.

Gaining the best educational technology practices that lead to the development of educational outcomes helps to preserve state resources and not waste money in failed experiments and projects. As noted above, Governments around the world are investing heavily in online learning and educational technology (Amiel, 2008). For example, In the Middle East, where this study will be conducted, governments have been authorizing almost 19% of their countries' government expenditure to education ("School of the Future," 2018). Saudi Arabia

education system budget is expected to augment to about USD 15 Billion by 2021. UAE education sector is expected to grow at a CAGR (Compound Annual Growth Rate) at 4.74 % between 2018-2022 ("School of the Future," 2018).

Many Middle Eastern countries have ambitious goals for utilizing technology to transfer education. However, the lack of teachers and faculty capable of using technology in innovative ways is one barrier that is standing in their way (Cavanagh, 2017). Understanding faculty perceptions of technology helps in designing professional development programs targeting faculty and classroom teachers and assisting in deducting value beliefs associated with professional needs. Educators are under pressure to integrate technology into teaching and learning by the media, accreditation organizations, teachers' administrations, state department of education, and ministry of education. Literature has provided educators with ideas and guidelines to effectively integrate technology into teaching and learning, but it falls short of providing cohesive guidelines for teachers and faculty professional development (King, 2002).

## CHAPTER II: LITERATURE REVIEW

### Introduction

This dissertation is concerned with faculty perception of educational technology in relation to technology integration level. This chapter is divided into five sections that address the components of the study: (1) technology impact on education, (2) non-transformative use of educational technology, (3) transformative use of education technology, (4) what affects transformative use of education technology - barriers to technology integration, and (5) faculty belief and technology integration.

### Technology impact on education

Despite the fact that technology has impacted every aspect of our lives, there is no robust evidence technology is enhancing and transforming education. Goodchild (2018) argues that there is a lack of systematic evidence supporting the enhancement offered by technology, and "technology enhanced learning is predicted on the promise of potential and purported transformation of teaching and learning" (P. 1). The argument that educational technology has not yet transformed education and has not yet fulfilled its potential to improve education has been there for years (Bottino, Forcheri, & Molfino, 1998; Ginserb & McCormick 1998; Keengwe, Onchwari, & Wachira, 2008). According to Zhao, Zhang, Lei & Qiu (2015) the impact on education has been extremely limited, and technology has not solved many significant educational problems on a large scale.

Furthermore, some believe that the rapid and heavy communication technology use in the classroom has negative effects on students' academic performance. For example, a study (Lei, & Zhao, 2007) found that students can benefit from spending up to 3 hours per day using a computer. However, if they spend too much time (more than 3 hours a day) on computer, their GPA will likely decrease. A qualitative study by Chou (2001) with Taiwanese students shows

that heavy internet use is correlated with poor academic performance. Chen and Peng (2008) found that students who are heavy internet users (more than 34 hours per week) had lower grades and lower learning satisfaction than non-heavy users. Fried (2008) reported a negative effect of laptop use in class on academic performance due to distraction.

Technology has introduced a new kind of instruction. In the last two decades, online and distance learning became a prominent part of the higher education system. However, the question remains whether online and distance learning are transforming education. Summers, Waigandt & Whittaker (2005) examined differences between online distance education and traditional classroom learning for undergraduate statistics course in terms of final grades and student satisfaction. The result indicated that there was not significant differences in grades between online students and face-to-face students. However, online students were significantly less satisfied with the course than face-to-face course students. York (2008) compared students' educational outcomes for a social work course that was offered in 3 formats: face-to-face, online, and hybrid. Course materials, assignments and time were the same for each group. The results showed no differences among these 3 groups in final grade, course content self-efficacy gain, or student satisfaction. The results from those study suggested that online instruction has no advantages over traditional instruction.

On this basis, one could argue that even when new technology tools are used, classroom practice remains fundamentally unchanged (Bottino, Forcheri, & Molfino, 1998). That is because technology has not changed what is taught, but merely the mode of delivery has reformed. According to Kirkwood, & Price (2013, p. 333) " Despite much talk about the potential of technology to transform teaching and learning in Higher Education, very often the reality is different with much university teaching remaining fundamentally unchanged"

### **Non-transformative use of educational technology**

Technology has been widely used in classrooms; however, it is being used in a non-transformative way or it is being used at only a fraction of its potential. For the most part, teachers and faculty who use technology in their teaching do so by having electronics simplify tasks, not by fundamentally changing how the subject is taught. For example, they translate lecture notes into PowerPoint presentations, and use course management tools to distribute course materials, assignments, and grades (Zemsky, Massy, 2004). On this regard, there is a gap between faculty and students use of technology on higher education. Faculty use of technology in instruction does not meet the students' expectations. Most faculty use technology more for administrative and research tasks. They mostly use technology such as word processing and email for communication and research rather than using technology such as the use of multimedia, course management system, asynchronous communication and social media for instruction (Kazley, A., Annan, D., Carson, N., Freeland, M., Hodge, A., Seif, G., & Zoller, J. (2013). Zhao, Zhang, Lei, & Qiu, (2015) argued that what is being done in the educational practice with technology is just assigning some current routine teaching responsibilities to technology. The teacher still "serves as the authority of knowledge and transfer their knowledge to students" (p. 36).

Magana (2017) introduced the T3 framework, which classifies technology integration into three domains: translational (automation, consumption), transformational (production, contribution), and transcendent (inquiry design, social entrepreneurship). The translational level is the lowest level of technology integration in the T3 framework, in which the technology is used to do old tasks in a new way using a digital tool. Most of today education technology practice fall in the lowest level of technology integration. This is unfortunately a factor why technology has a limited impact in our teaching and learning (see appendix D: T3 framework).

Megana (2017) defines translational level as " transferring or bearing something or some task across two different temporal modalities" (p. 27), such as the translation of a message from one language into another. In this case, we just use a different method to generate the meaning while the meaning of the message stays the same. The translational integration level consists of two steps: T1.1: automation and T1.2: consumption. Both levels can be used as a guide to utilize educational technology tool in administrative, instructional or learning tasks (Megana,2017).

The translational level is classified into two domains. Automation is the step where a teacher or student use technology to automate the instructional or learning tasks. For example, instead of using pencil and paper to write an essay, students can be asked to use word processing software. The values of such automation are saving time, increasing efficiency, and improving accuracy. Regarding educational technology practice, most teachers fall in automation level (Thornburg, 2013). This is a very low level of integration. However, this level is important and can add value to the teaching and learning experience, but it does not directly affect the process of teaching and learning. It is more important in terms of increasing the speed, the efficiency, and the accuracy of administrative tasks. If the teachers need to improve their technology practice in the classroom, they are going to have to go through to the next step (Megana,2017).

The second step in this level is consumption where the technology is used to consume information in a digital medium. Megana (2017) defines consumption in the context of education as " the task of accessing some digital form of content-related information of knowledge" (p. 31). The digital form could be any type of media such as textual, auditory, visual or in some combined multimedia format. Because of the availability of digitally accessible content information in a variety of forms, teachers no longer need to depend on a textbook as a source of information (Megana,2017). In order to witness a crucial impact, we need to move beyond the

translational level to transforming current practice then approaching and adopting transcendent uses of technology.

Zhao, Zhang, Lei, & Qiu, (2015) considered using technology for consuming existing knowledge one of the mistaken approaches that prevent transformative use of technology and therefore prevent transforming education. Using technology to consume knowledge is based on the traditional assumption about how students learn, which assumes that students learn by absorbing and consuming existing curriculum. Therefore, technology is there to help them learn the existing knowledge better.

Also, we used to focus our practice in the classroom around the medium, therefore, we blame the medium for any failure. These kinds of practices are based on displacement theory and media comparison studies. The idea of displacement theory and media comparison studies are driven by an assumption that media are a hierarchy and that we better rank them to use the best of them in our teaching (Zhao, Zhang, Lei, & Qiu, 2015).

A large body of research in the field of educational technology was conducted based on the view of displacement theory and media comparison studies. This type of studies commonly compares two types of educational technology such as comparing a TV with a radio and a computer with a tablet (Zhao, Zhang, Lei, & Qiu, 2015). However, according to Zhao, Zhang, Lei, & Qiu, (2015) employing a specific technology to deliver instruction will not improve teaching and learning. Richard & Clark (1983) pointed out that "Based on this consistent evidence, it seems reasonable to advise strongly against future media comparison research. Five decades of research suggest that there are no learning benefits to be gained from employing different media in instruction, regardless of their obviously attractive features or advertised superiority" (p. 450).

Non-transformative use of educational technology is centered around the definition of educational outcomes, which is broadly represented by test scores. Test scores play a crucial role in most aspects of schooling, such as school funding, teacher evaluation, and student recruitment. In other words, higher test scores mean the student has more opportunities to be admitted to university or college, teachers get merit pay, and administrators get better funding and attracting qualified teachers. While this is the case, technology is treated and expected by many to improve student test scores. If technology failed to significantly improve test scores, the doubt and disappointment will be directed at educational technology (Zhao, Zhang, Lei, & Qiu, 2015).

For example, Richtel, M (2011) in his article in New York Times questioned whether investments in educational technology were worth it. Richtel reported a case of the Kyrene School District, which is considered an exemplary school district for technology integration by the National School Boards Association and has earned widespread praise. However, the test scores were unfortunately disappointing, so the Kyrene School District cast doubt about educational technology investment. Some school districts have abandoned one-to-one laptop programs since those programs showed “little, if any, measurable effect on grades and test scores” (Hu, 2007.p.7).

### **Transformative use of educational technology?**

Transformative use of educational technology that transfers education requires a new way of thinking about educational technology adoption and classroom practices, which go beyond current traditional practice. It is important to reconsider the relationship between human and technology. For decades, questions about the relationship between technology and teacher have been posed, such as: will TV replace teachers? Will computers replace teachers? Will online education replace teachers? Will tablets replace teachers? A large body of research is focused on

asking whether certain educational technologies are better than or could potentially replace teachers. These types of questions are based on displacement theory and media comparison studies. The idea of displacement theory and media comparison studies are driven by an assumption that media are a hierarchy and that we better rank them to use the best of them in our teaching (Zhao, Zhang, Lei, & Qiu, 2015).

The ideal use of technology includes all components of the educational environment. Each component of the ecosystems has its own role to play. On top of that, in the learning environment each component has its important role, especially the teacher, who has a particular function that other components in the system do not have or cannot replace (Zhao, Zhang, Lei, & Qiu, 2015). The idea of viewing learning environment as an ecosystem is to focus on the strengths and weaknesses of each component in the system taking into consideration the interrelationship among those components. Zhao, Zhang, Lei, & Qiu (2015) stated that " we need to first analyze the strengths/niches of computers and humans and then construct a learning environment that taps the strengths/niches of both" (p. 13). The central idea according to Levy and Murnane (2013) is "to let computers (i.e., robots) do what they are good at, and humans should be trained to do what computers don't do" (p. 6).

Therefore, what are the things the computer can do better and what are the things the human can do better? the human mind's strengths are flexibility and the ability to process and integrate complex tasks, while the computer's strengths are speed and accuracy (Levy, Murnane, 2013). Also, technology is better at mechanical repetitive tasks as well as creative ways of presentation and interaction. On the other hand, humans are better at critical thinking and social and emotional interaction (Zhao, Zhang, Lei, & Qiu, 2015).

Transformative use of educational technology views students as knowledge creators. Students learn better by constructing their own knowledge, creating projects, initiating communication, and sharing their experiences and feelings (Zhao, Zhang, Lei, & Qiu, 2015). Magana (2017) classified in his T3 framework of technology integration technology use to create and share knowledge as the second level of technology integration (transformational level).

In transformational level, “technology must give rise to dramatic or substantive changes in both the task to which the technology tool is applied and the person enacting the task” (Magana 2017, p. 38). According to Magana (2017) "transformational technology use in education is the intentional application of digital technologies to unleash students' learning expertise, in a way not possible without technology, to achieve ever higher levels of knowledge and mastery" (p. 39). Put differently as Magana stated, " How can students use technology to represent what they know, what they are able to do, how they think, in ways that are not possible without the technology" (p. 41). The transformational integration level consists of two steps: production and contribution.

Production: the production step refers to the use of technology to produce a digital representation of students' knowledge and the path to this knowledge. Magana (2017) argues that the definition of production in educational context must be broad to include three critical elements: (1) “student production of authentic evidence of growth and mastery using digital tools,” (2) “the quality of knowledge artifacts that students produce with digital tools,” and (3) “the thought pathways students have followed to create those artifacts” (p.42).

Magana (2017) suggested three strategies teachers can use to implement production steps. The first step is for students to produce personal mastery goals. In this strategy, teachers help students to establish meaningful learning goals and then keep track of their progress. Second,

students track and visualize their growth and mastery. In this strategy, teachers motivate students by giving them the opportunity to regularly track their own progress towards mastery. The third and final step is for students to produce and archive authentic knowledge and thought artifacts. This strategy involves " students using digital tools to create an authentic multimedia representation of their declarative and procedural knowledge and to make their thinking regarding both explicit" (p. 47).

Contribution: In this level, students use technology to produce and present digital artifacts to others. It is important in this stage to develop an interdependent learning environment that functions as a learning community. It is also important to express to students from the beginning that the goal of designing and creating knowledge products is to contribute their own perspective and understanding to the knowledge gains of others.

With a transformative use of educational technology students can achieve something well above and beyond the normal range of expectations, outcomes, and experiences in traditional classrooms. This level of technology use is represented in the third level of Megana T3 framework of technology integration, which is the transcendent level. In transcendent level student's passion is a key element. What students deeply care about is what pushes them to exceed their expectations and to enable maximum growth in the learners' cognitive capabilities (Megana,2017: Wang, 2018). The transformational integration level consists of two steps: inquiry design and social entrepreneurship.

Inquiry design: in this level students use technology to design their own learning journeys guided by their passion to solve real-life problems they deeply care about. In this step, students use technology to investigate the problem that matters most to them by asking the proper questions that precisely address the problem, hypothesizing plan and goals, then finding a robust digital solution (Megana,2017).

Social entrepreneurship: in this step, students engage in "social entrepreneurship activities may serve to unleash learners' latent leadership potentially by framing the generation of value within the context of solving wicked problems that matter" (Megana,2017, p. 67). To implement this stage of technology use Megana (2017) suggested three strategies: (1) " student imagine, design, and create new tools or platforms to solve wicked problems that matter"(p. 77), (2) " student beta test., Iterate, and generate robust versions of their digital solutions"(p. 80), and (3) students scale the implementation of their robust digital solutions" (p. 82).

### **What effects does the transformative use of educational technology have: Barriers to technology integration?**

Technology integration is a leading trend in contemporary education practice (Tsai, Chai, 2012). However, there are many factors that affect faculty technology integration into instruction. According to Compeau, and Higgins (1995) these factors have been an issue since the 1970s. Researchers use different definitions of barriers and classification schema to understand how barriers influence technology adoption, and to explain how faculty and administration react to emerging technology and changing learning environment (Abrahams, 2010).

Ertmer (1999) developed a framework that divided technology integration in education barriers into first and second order barriers. The model built upon Fullan and Stiegelbauer (1991) concept of first and second order models of change. Some refer to these barriers as internal and external barriers (Minshew, Anderson. 2015). The first-order barriers represent the external factors that may constrain technology integration. The second-order barriers represent internal factors that affect technology integration.

First-order barriers are those barriers related to institutional resources such as technical support, technical infrastructure, having access to available technology, time with technology,

and training and development programs (Hew & Brush, 2007). External barriers can be classified into three categories: connectivity, establishing a reliable technical infrastructure that guarantees permeant accessibility to technological services; professional development, which is needed to be structured to fit the technology needs of teachers; application acquisition, which encompasses the policies and procedures that exist within the institution to organize technology practice (Hew, Brush, 2007).

Internal barriers are much more personal and intrinsic and more deeply ingrained to instructors. The internal barriers can prevent instructors from utilizing technology in teaching even if there are no external barriers. According to Hew and Brush "These barriers included, but were not limited to, teachers' knowledge about technology, a perception of their technology practice and the value of the technology itself" (2007. p3).

Tsai (2012) suggested discussing and adding one more barrier that is the teacher's design thinking. Tsai argues that " if both first-order and second-order barriers have been removed, will technology integration happen" (2012. p2). Even if the instructor was provided with a well-built facility, an acceptable technical infrastructure, digital resourses, positive attitude and strong beliefs in technology, and appropriate technical skills, he/she may not necessarily have successful technology integration. This is due to the lack of design thinking, which is crucial to reorganizing and creating instructional materials and activating that fit varying group of learners in this dynamic learning environment.

### **Faculty belief and technology integration**

The past thirty years have seen an increasingly rapid discussion among educators regarding technology integration into instruction (Lowther, Strahl, Inan, & Ross, 2008). Considerable articles and books have been published proposing effective strategies to promote meaningful integration. A great portion of these articles focus on how to approach and eliminate

barriers that instructors and educational institutes encounter during the process (Ertmer, et al., 2012).

Ertmer (2005) argues that key components of technology integration barriers have been nearly addressed and resolved. Becker (1949) identified four conditions that the teacher should meet to successfully integrate technology into instruction: (a) have convenient access, (b) are adequately prepared, (c) have some freedom in the curriculum, and (d) hold personal beliefs aligned with constructivist pedagogy. According to Ertmer (2005), the first three of these conditions appear to be in place. The National Center for Education Statistics reported that the ratio of students to an available computer has reached 1.7 across all public schools (Gray, Thomas, & Lewis, 2010). One-on-one laptop initiatives aiming to provide constant access to at least one computing device for every student in a classroom have advanced across multiple states (Zheng, et al., 2016).

However, recent researches have shown that the current level of technology integration is still surprisingly low, (Ertmer, 2005), and yet not advanced to the best practice advocated in the literature (Dede, 1998; Ertmer, 2005). Increasing access to the technology does not mean higher quality technology integration (Ertmer & Ottenbreit-Leftwich, 2010). Ertmer (2005) attributed that to additional barriers, specifically related to instructors' pedagogical beliefs which is much less understood and, consequently, less readily resolved. According to Ertmer, "Previous researchers have noted the influence of teachers' beliefs on classroom instruction specifically in math, reading, and science, yet little research has been done to establish a similar link to teachers' classroom uses of technology" (2005, p 25).

Instructors' beliefs have not yet been understood due to in part the fact that changing instructors' beliefs confronts instructors' fundamental belief, and thus, requires new ways of both seeing and doing things. Nevertheless, changing first-order barriers requires adjusting current

practice in an incremental fashion without chaining existing structures or beliefs. Additionally, first-order changes are reversible, while second-order changes are irreversible, and it is hard to return to the previous routines and habits once you begin a new one (Brownlee, 2000). These types of "changes are riskier for teachers, as well as more difficult to achieve" (Ertmer 2005. p 26). Furthermore, staff developers are much less familiar with how to facilitate and support these types of changes (Garet, Porter, Desimone, Birman, & Yoon, 2001).

Instructors' beliefs, attitudes, and perceptions of education technology was found to be a fundamental factor in the level and quality of technology integration in the classroom (Ottenbreit-Leftwich et al., 2010). In 2007, Hew and Brush conducted a study that analyzed technology integration barriers that have been identified in the literature over ten years (1995-2006). Based on the analysis of 48 empirical studies, the three most frequently cited barriers to technology integration are recourses, teachers' knowledge and skills, and teachers' attitudes and beliefs (Hew, & Brush, 2007).

The beliefs teachers hold affect their practice in the classroom. Those who hold more positive attitudes toward educational technology are more likely to use technology in delivering curricular contents (Mueller, Wood, Willoughby, Ross, & Specht, 2008), restructure learning goals (Miranda and Russell, 2012) and adopt more student-centered and cognitively stimulating instructional approaches (Hixon and Buckenmeyer, 2009, Hsu, 2016). The researcher suggested that teachers with more positive value beliefs maximize their resource to overcome other external barriers to technology integration (Ertmer, et al., 2012).

There is a lot of confusion in the literature regarding the definition of teacher beliefs. Part of this confusion centers on how to differentiate teacher beliefs from teacher knowledge (Ertmer, 2005). Calderhead (1996, p. 715) suggested a distinction between these two concepts: beliefs generally refer to "suppositions, commitments, and ideologies," while knowledge refers

to “factual propositions and understandings”. That means even if you have knowledge about how to use specific technology such as a spreadsheet for student record keeping, yet still do not believe that technology is an effective tool for the classroom use. For more specification, when we refer to teachers’ beliefs we focus on teachers' educational beliefs about teaching and learning, and the beliefs they have about how technology can help to translate those beliefs into classroom practice (Ertmer, 2005).

If we need to achieve fundamental changes in the use of educational technology in everyday teaching and learning practice, we need to pay attention to teachers' beliefs about teaching, learning, and technology. Marchinkiewicz (1993) concluded, “Full integration of computers into the educational system is a distant goal unless there is reconciliation between teachers and computers. To understand how to achieve integration, we need to study teachers and what makes them use computers” (p. 234).

### **Diffusion of innovation theory**

The field of educational technology has suffered from a lack of transformative use of technology. Professionals in the field have used the theory of innovation diffusion to increase the meaningful adoption of technology. Diffusion is defined as “the process by which an innovation is adopted and gains acceptance by members of a certain community” (Surry,1997). According to Rogers (1995, p.5) Diffusion is “the process by which an innovation is communicated through certain channels over time among the members of a social system”. Rogers (1995) suggested four factors that affect the diffusion process: the innovation itself, how information about the innovation is communicated, time, and the nature of the social system into which the innovation being introduced.

Diffusion of innovation theory has been incorporated into the field of educational technology to investigate how technology is adopted or not and why some technologies are

adopted at a faster or slower rate than other, and to examine a range of organizational and information systems adoption processes (Tabata, & Johnsrud, 2008). Surry (1997) argued that the study of diffusion of innovation theory is valuable to education technology field for three reasons: first, the reason why many technologies are, or are not, adopted or integrated into teaching remains a mystery to the field. Second, educators who understand the innovation process will be more prepared to utilize technology effectively. Third, the study of diffusion theory could lead to the development of a systematic model of technology integration and diffusion.

## CHAPTER III: METHODOLOGY

### Introduction

The major purpose of this quantitative study is to investigate if there is a relationship between faculty perception of educational technology and technology integration into higher education instruction. This chapter describes the research procedures that have been used to design a reliable instrument, and the statistical procedures used to analyze the collected data in the following sections:

1. The purpose of the study.
2. Research design.
3. Research questions.
4. Research hypotheses.
5. Research hypotheses' connection to the literature review.
6. Data collection procedures.
7. Description of the Variables.
8. Research Sampling.
9. Instrumentation.
10. Reliability and validity.
11. Translation of the instrument.
12. Data analysis.

### The purpose of the study

As stated in the first chapter, the purpose of this study is to examine the level of technology integration into teaching and learning by Saudi university faculty members. Additionally, another goal of this study is to investigate Saudi university faculty members' perceptions of educational technology. Most importantly, the main purpose of this study is to

investigate whether there is a relationship between Saudi university faculty members' perception of educational technology and the level of technology integration into teaching and learning.

### **Research design**

In this study, data were collected, organized, tested, and analyzed through quantitative research methods to investigate the relationship among variables: (1) faculty integration of technology and (2) faculty perception of educational technology. To achieve the research objectives, three research questions and three hypotheses were generated and stated as the null hypotheses. The hypotheses were tested at the .05 level of significance.

### **Research questions**

In order to investigate the variables and the relationship among them the following research questions were created:

1. To what extent do Saudi university faculty members use, or integrate, technology in teaching?
2. What are Saudi university faculty members' perceptions of educational technology?
3. Is there a significant relationship between the perceptions of educational technology and educational technology integration by Saudi university faculty members?

The third question consists of the following sub-questions:

- a) Is there a significant relationship between the perceptions of educational technology and the translational level of technology integration Saudi university faculty members?
- b) Is there a significant relationship between the perceptions of educational technology and the transformational level of technology integration by Saudi university faculty members?

- c) Is there a significant relationship between the perceptions of educational technology and the transcendent level of technology integration by Saudi university faculty members?

### **Research Hypotheses**

The following hypotheses were created in order to test the research questions:

H1: Saudi university faculty members have a low-level of technology integration.

H2: Saudi university faculty members have misperception of educational technology.

H43: There is a relationship between the perceptions of educational technology and educational technology integration by Saudi university faculty members.

### **Research hypotheses' connection to literature review**

The review of literature addressed technology impact on education, improper use of technology education, proper use of educational technology, what affect the proper use of educational technology, and faculty' belief and educational technology integration. In the following the researcher will address the points of agreement, which guided the researcher to draw the research hypotheses:

1. Faculty use technology for demonstrative and research tasks more than they use it for educational transformation. They mostly use technology, such as word processing and email for communication and research rather than using technology such as the use of multimedia, course management system, asynchronous communication and social media for instruction ( Kazley, A., Annan, D., Carson, N., Freeland, M., Hodge, A., Seif, G., & Zoller, J. (2013).

2. Technology has not transformed education because several mistaken approaches related to faculty' fundamental belief. Faculty' beliefs, attitudes, and perceptions of education technology were found to be a fundamental factor in the level and quality of technology integration in the classroom (Ottenbreit-Leftwich et al., 2010). Hew & Brush (2007) found out

that faculty's' attitudes and beliefs are considered one of the three most frequently cited barriers to technology integration. Due to those mistaken approaches, Zhao (2015) call for a reconceptualization of educational technology.

3. Even though the key components for successful technology integration have been nearly addressed and resolved, the current level of technology integration is still surprisingly low. Ertmer (2005) attributed that to additional barriers, specifically related to instructors' pedagogical beliefs which is much less understood and, consequently, less readily resolved. For this reason, the researcher assumes that there is a relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia.

### **Data collection procedures**

The researcher has developed a survey, especially for this study. The integration section of the survey was developed based on the concept of the T3 technology integration model created by Megana (2017) in his book *Disruptive classroom technologies: A framework for innovation in education*. The perception section of the survey was developed based on the concepts of the top 5 EdTech mistakes that were explained in the book *Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes* by Zhao, Zhang, Lei, & Qiu, (2015). The participants were asked to complete an electronic survey (Qualtrics) after they read and electronically signed the consent letter that informs them about the nature of the study and informs them that their information and responses will be confidential. The survey was e-mailed to the faculty members in Saudi Arabia.

Both Arabic and English versions of the survey were distributed to the participants, because among those participants were faculty members who do not speak/read English. The survey was sent to the school of education graduate studies at King Abdul-Aziz University, then

through the college email system the survey was sent to all faculty emails. The researcher also, sent personal emails to more than 700 faculty members in King Abdul-Aziz university.

### **Description of the Variables**

There are six variables to this study, one dependent variable and five independent variables:

#### Dependent variables (DV)

1. Level of education technology integration among faculty members in Saudi Arabia. This construct consists of 6 dependent variables:
  1. Translational Level: automation and consumption
  2. Transformational Level: production and contribution
  3. Transcendent Level: inquiry design and social entrepreneurship

#### Independent variables (IV)

1. Faculty members' in Saudi Arabia perception of educational technology. This construct consists of 5 independent variables:
  1. Complementing in an Ecosystem Versus Replacing in a Hierarchy
  2. Technology as Tools for Consumption Versus Tools for Creating and Producing.
  3. Technology to Raise Test Scores Versus Technology to Provide Better Education
  4. Technology as Curriculum Versus Digital Competence
  5. Top Down Versus Bottom Up

### **Research Sampling**

The participants of this study will be faculty members in Saudi universities from both male and female campuses, from all academic rankings (professor, associate professor, assistant professor, lecturer, teaching assistant), from all colleges and schools.

## **Human Subjects' Committee Approval**

Institutional Review Board (IRB) approval to conduct this study was requested from the KU Human Subjects Committee, at Lawrence, Kansas campus. The approval was granted to collect the data on 3/11/2019 (See Appendix B). Following that, sample information statement, explaining the study and how it would be conducted was sent to the participants with the survey (see Appendix C).

## **Instrumentation**

A survey is designed specifically for this study. The survey is designed after reviewing several existing surveys that have been used with the related subject matter. The researcher created most of the survey's items, and some items were compiled from the literature review and modified. The survey consists of three sections: demographic information, technology integration levels, and faculty perceptions of technology. The first section of the survey will include several demographic checkbox questions that are outlined to collect data regarding faculty's professional ranks (Professor, Associate Professor, Assistant Professor, Lecturer, and Teaching Assistant), years of teaching experience, gender, and age.

The researcher designed the technology integration section based on the T3 framework of technology integration by Magana (2017) to measure faculty technology integration level. The technology integration section is composed of 6 dimensions (automation, consumption, production, contribution, inquiry design, and Social Entrepreneurship) derived from the Magana T3 framework (see Appendix D).

Magana (2017) introduced several questions in each stage of his framework. These questions help educators identify in which stages of technology use they are. The researcher utilized and modified some of these questions into six-response Likert scale items. These six-point Likert scale items will be coded 1= strongly disagree, 2 = disagree, 3 = somewhat disagree,

4 = somewhat agree, 5 = disagree, 6 = strongly agree. This section consists of 19 items. Some of the survey questions are as follows:

- I use technology to communicate with other faculty, administrators, and students.
- I use digital tools to present new content information.
- My students use digital tools to consume interactive content-related resources.
- My Students use technology to accomplish things that they could not have done without the technology.
- I use and direct my students to use technology to create tutorials/learning materials.
- I use technology to engage my students in social entrepreneurship tasks that are driven by authentic passion and need.

The perception section is designed to identify the main perceptions that faculty members have of educational technology. This section is designed based on the ideas that Zhao et al. (2015) presented in their book *Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes*. Zhao et al. (2015) illustrated the top 5 EdTech mistakes in five chapters. The researcher read the book and extracted the main concepts of each chapter then he came up with survey items that represent the comprehension of these concepts.

The faculty perception section is composed of 5 dimensions, each dimension represents one EdTech conceptual mistake (complementing in an ecosystem versus replacing in a hierarchy, technology as tools for consumption versus tools for creating and producing, technology to raise test scores versus technology to provide better education, technology as curriculum versus digital competence, and top-down versus bottom up). These five concepts will be measured by six-response Likert scale items. These six-point Likert scale items will be coded 1= strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = somewhat agree, 5 = disagree, 6 = Strongly agree. This section consists of 19 items. Some of the survey questions are as follows:

- I often hold reservations toward the use of technology in the classroom.
- I need to rank technology tools to find out which is better in instruction.
- Technology can solve any educational problem.
- The main goal of using technology is to help students access existing knowledge.
- Teachers must use technology to help students get high scores on standardized tests.
- The university mandates the use of technology.

### **Reliability and validity**

Reliability is the degree to which a survey instrument consistently measures whatever it is designed to measure (Slavin, 1992). In other words, reliability is to what extent the test score is dependable, consistent, and precise when it is used more than one time. One way to report evidence of internal reliability is to measure coefficient alpha or Cronbach's alpha, which is a number that ranges from .00 to 1.00. The higher the number, the more internally consistent a test's items behave (Frey, 2006). To evaluate the reliability of the instrument used in this study, the researcher will conduct a pilot study in order to calculate the internal consistency coefficient (Cronbach's Alpha). Cronbach's Alphas for Each section (perception and integration) will be calculated separately in order to measure the consistency of scores across items.

Validity is the extent to which the instrument measures what is intended to measure (Frey, 2006). To make sure the survey is valid and accurate in measuring faculty' perceptions of technology and technology integration level, the researcher works closely with professor Zhao the author of the book *Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes* to review and edit the survey. Also, the researcher will consult a panel of experts (faculty members and doctoral students) to review and modify the items as suggested. All the experts either specialize in education technology or educational psychology and research.

**Translation of the instrument**

As I stated earlier, among the participants are faculty members do not speak English as their first or second language; therefore, they might not understand the survey accurately. The researcher will translate the survey into Arabic and reword the instruments adopted in this study.

To ensure the validity of the survey, four Experts in both language (English/Arabic) will be consulted and will revise both versions of the survey. Among those experts are a linguistic professor and TESOL doctoral students. Forward and backward translation method will be conducted to ensure the accuracy of the instrument. The researcher will match the two versions and make sure there is no significant differences.

**Data Analysis**

Different statistical methods will be used to analyze the data depending on the types of the questions. Descriptive statistics will be computed to analyze demographic data. The means, frequencies, modes, standard deviations, and percentages will be computed to form a better understanding of the population of the study. A multiple linear regression will be conducted to examine how the independent variables predict the dependent variable. The Statistical Package for Social Sciences (SPSS) will be employed to analyze the data. All analysis of the study will be conducted using  $p < .05$  as the level of statistical significance.

## CHAPTER IV: RESULT

### Introduction

This chapter describes the analysis of data that were collected to identify, describe, and measure (a) the extent of technology integration in teaching by faculty members in Saudi universities, (b) Saudi university faculty members' perceptions of educational technology, and (c) the relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi universities. The chapter includes the description of population and sampling, descriptive statistics of the data, reliability analyses, research question results, and a chapter summary.

### Description of Population and Sampling

The participants in this study were both male and female Saudi university faculty members. The study was conducted the second week of March 2019. A total of 4,000 emails that contained two links (Arabic and English versions) were sent to Saudi university faculty members. A total of 391 responses were returned while 83 incomplete responses were excluded. The sample size was adjusted to 308. The sample consisted of 308 participants, 45.5 % of them were males ( $n = 140$ ), and 54.5 % ( $n = 168$ ) were females. Table 1 reports the frequencies and percentages associated with sex categories.

**Table 1.** Number of Participants Based on sex

		Frequency	Percent	Valid Percent
Valid	Male	140	45.5	45.5
	Female	168	54.5	54.5
	Total	308	100.0	100.0

## Research Questions

The data of this study were collected using two versions (Arabic and English) of the electronic survey. The surveys were designed and distributed by Qualtrics. The research questions and hypotheses were analyzed using descriptive statistical methods and multiple linear regression. All analyses conducted used  $p < .05$  as a level of statistical significance. The Statistical Package for Social Science (SPSS) software (Version 25) was used to analyze the data in this study. This study included three questions and three sub-questions as follows:

1. To what extent do faculty members in Saudi Arabia use, or integrate, technology in teaching?
2. What are Saudi university faculty members' perceptions of educational technology?
3. Is there a significant relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia?

The third question consists of the following sub-questions:

- d) Is there a significant relationship between the perceptions of educational technology and the translational level of technology integration by faculty members in Saudi Arabia?
- e) Is there a significant relationship between the perceptions of educational technology and the transformational level of technology integration by faculty members in Saudi Arabia?
- f) Is there a significant relationship between the perceptions of educational technology and the transcendent level of technology integration by faculty members in Saudi Arabia?

## Demographic Description

The following descriptive results define the demographic characteristics of the study participants. Demographic information includes sex, academic rank, years of teaching experience, college or school of teaching, nationality, and country of graduation.

### Participants' sex

The sample consists of 308 participants, 45.5 % of which were male (n = 140), while 54.5 % (n = 168) were female. Table 1 reports the frequencies and percentages associated with sex categories.

### Participants' Academic Ranks

Participants' academic ranks were categorized into 6 ranks (full professor, associate professor, assistant professor, lecturer, teaching assistant, and others). This categorization was based on the regulations governing the academic affairs of the Saudi university faculty members. Table 2 shows the frequencies and percentage associated with the academic rank categories. The greatest number of participants were lecturers (129, i.e. 41.9 %). The smallest group was the teaching assistants (16, i.e. 5.2 %).

**Table 2.** Number of Participants Based on academic ranks

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full Professor	28	9.1	9.1	9.1
	Associate Professor	41	13.3	13.3	22.4
	Assistant Professor	93	30.2	30.2	52.6
	Lecturer	129	41.9	41.9	94.5
	Teaching Assistant	16	5.2	5.2	99.7
	other	1	.3	.3	100.0
	Total	308	100.0	100.0	

### Participants' Years of Teaching Experience

Table 3 reports the frequencies and percentage associated with participants' years of teaching experience. 91 of the participants had 1-5 years of teaching experience, which represented 29.5 % of the total number of participants. Also, 91 of the participants had 6-10 years of teaching experience, which represented 29.5 % of the total number of the participants. 56 of the participants, or 18.2 %, had 21 years or more of teaching experience.

**Table 3.** Years of teaching experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 5 years	91	29.5	29.5	29.5
	6 - 10 years	91	29.5	29.5	59.1
	11 -15 years	44	14.3	14.3	73.4
	16 - 20 years	26	8.4	8.4	81.8
	21 years or more	56	18.2	18.2	100.0
	Total	308	100.0	100.0	

### Participants' college

The largest group of participants was from the School of Liberal Arts and Humanities (48 participants, 15.6%). The second largest group was from the School of Environmental Designs (37 participants, 12%). There were 35 participants (11.4%) from the School of Education, and 29 participants (9.4%) from the School of Applied Medical Science. Table 4 represents the frequencies and percentage associated with participants' schools.

**Table 4.** school/college

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Liberal Arts and Humanities	48	15.6	15.6	15.6
Engineering	17	5.5	5.5	21.1
Sciences	36	11.7	11.7	32.8
Family Sciences	8	2.6	2.6	35.4
Education	35	11.4	11.4	46.8
Law	4	1.3	1.3	48.1
Medical	5	1.6	1.6	49.7
Medical Rehabilitation Sciences	2	.6	.6	50.3
Computing and Information Technology	21	6.8	6.8	57.8
Nursing	5	1.6	1.6	59.4
Dentistry	10	3.2	3.2	62.7
Pharmacy	10	3.2	3.2	65.9
Applied Medical Science	29	9.4	9.4	75.3
Economics and Administration/Business Administration	10	3.2	3.2	78.6
Marine Sciences	7	2.3	2.3	80.8
Communication and Media	6	1.9	1.9	82.8
Home Economics	7	2.3	2.3	85.1
Meteorology, Environment and Arid Land Agriculture	4	1.3	1.3	86.4
Environmental Designs	37	12.0	12.0	98.4
Others:	5	1.6	1.6	100.0
Total	308	100.0	100.0	

### Participants' nationality

As shown in table 5, 83.8% of participants (n = 258) were Saudi citizens, and 16.2% of participants were Non-Saudi (n = 50).

**Table 5.** Nationality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Saudi	258	83.8	83.8	83.8
	Non-Saudi	50	16.2	16.2	100.0
	Total	308	100.0	100.0	

### Participants' Graduation country

The results show that 102 faculty members earned their highest degree from The United States (33.1%). 98 of the participants earned their highest degree from Saudi Arabia (31.8%). 55 participants earned their highest degree from the United Kingdom (17.9%). Table 6 represents the frequencies and percentage associated with participants' country of graduation.

**Table 6.** Participants' Graduation Country

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Saudi Arabia	98	31.8	31.8	31.8
	United States	102	33.1	33.1	64.9
	United Kingdom	55	17.9	17.9	82.8
	Canada	6	1.9	1.9	84.7
	Australia	7	2.3	2.3	87.0
	Egypt	11	3.6	3.6	90.6
	Jourdan	16	5.2	5.2	95.8
	Germany	1	.3	.3	96.1
	France	1	.3	.3	96.4
	Others	11	3.6	3.6	100.0
	Total	308	100.0	100.0	

### Reliability Analysis

Cronbach's Alpha was calculated to measure the internal consistency across sets of items as a group. There were two main sections for the survey. The first section measured the current level of educational technology integration into teaching by faculty members. In this section,

there were three constructs to be measured: (a) integration – translational level, (b) integration – transformational level, (c) integration – transcendent level. The second section measured faculty members’ perception of educational technology. There were five sub-constructs under this section. However, the researchers considered the whole section to be one construct because they were measuring the same level of perceptions, and some sub-constructs consisted of two items, which is not enough to test internal consistency. As illustrated in Table 7, Cronbach’s Alpha coefficients for translational level of technology integration was .75, .87 for transformational level of technology integration, and .93 for transcendent level of technology integration. Cronbach’s Alpha coefficients for the second section “faculty members’ perception of educational technology” was .75. The values of the Cronbach’s Alpha coefficients for these constructs were relatively high enough to conclude that there was a sufficient consistency among the survey items in each construct.

**Table 7.** Current Reliability Coefficients

Scales	N of Questionnaire items	Cronbach’s Alpha
Integration- Translational Level	7	$\alpha = .75$
Integration- Transformational Level	7	$\alpha = .87$
Integration- Transcendent Level	5	$\alpha = .93$
Perception of educational technology	13	$\alpha = .75$

### Findings of the Research Questions

Question one and question two were analyzed by using descriptive statistical methods. Question number three, which consisted of three sub-questions, was analyzed by using multiple regression analysis. The following section illustrates in detail how data were analyzed to answer each of the research questions.

**Question one:** To what extent do faculty members in Saudi Arabia use, or integrate, technology in teaching?

To answer this question, descriptive statistics was used to examine the current level of technology integration into teaching by university faculty members. Participants were asked to rate their level of technology integration into teaching by responding to 19 items. These items categorized technology integration into three levels. Items 1- 7 represented the lower level of technology integration (Translational Level). Items 8 -14 represented the middle level of technology integration (Transformational Level). Items 15 - 19 represented the highest level of technology integration (Transcendent Level). (See index D)

Participants' responses were measured using a six-point Likert scale: 1 = Strongly disagree, 2 = disagree, 3 = Somewhat disagree, 4 = Somewhat agree, 5 = agree, 6 = strongly agree. A higher score in one category means that the participant is more fitting into that category. On the contrary, a lower score in one category means that the participant is not fitting into that category. The items of each category were computed into one variable (mean).

For the translational level, participants were asked to rate their agreement on statements such as: I use technology in my instruction to save time; I use technology to communicate with other faculty members, administration, and students; I use technology to reduce task-related errors; I use technology to test and grade students effectively; and I encourage my students to use technology to consume or use interactive content-related resources. The mean and standard deviation of the variable were calculated and reported in Table 8. As shown in Table 8, faculty members strongly agreed to the statements that categorized them into the translational level of technology integration ( $M = 5.35$ ,  $SD = .499$ ). This finding was expected and suggests that faculty members' current educational technology practices fit into the translational technology integration level. However, that does not mean this is the only level they can fit into because the

T3 technology integration model is a cumulative model, meaning that you cannot acquire a high level of educational technology integration without practicing a lower level method.

For the transformational level, participants were asked to rate their agreement on statements such as: I encourage my student to use technology to produce works that represent their learning/knowledge; I encourage my student to use technology to accomplish things or Educational gains or educational objective that they could not have done without it; I use technology to track my students educational progress; I encourage my students to use technology to create tutorials/learning materials; and I encourage my students to engage in social media learning discussion. The mean and the standard deviation of the variable were calculated and reported in Table 8. As shown in Table 8, faculty members agreed to the statements that categorized them into the transformational level of technology integration ( $M = 4.8$ ,  $SD = .84$ ). The finding suggests that faculty member fit into the transformational level of educational technology integration model.

For the transcendent level, participants were asked to rate their agreement on statements such as: I encourage my students to use technology to solve a real-life problems that matter to them; I encourage my students to use technology to organize a group work in order to achieve common goals; I encourage my students to use technology to engage in social entrepreneurship tasks that are driven by authentic passion and need; and I encourage my students to use technology to evaluate their implementation of the digital solutions to an authentic problem. The mean and standard deviation of the variable were calculated and reported in Table 8. As shown in Table 8, faculty members somewhat agreed to the statements that categorize them into the transcendent level of technology integration ( $M = 4.6$ ,  $SD = .84$ ). One unanticipated finding was that faculty members fit into the transcendent level of educational technology integration model, but at lower rate than the previous levels.

**Table 8.** Technology integration level

	Translational	Transformational	Transcendent
N	308	308	308
Mean	5.35	4.8	4.6
Std. Deviation	.49	.84	1.10

**Question Two:** What are Saudi university faculty members' perceptions of educational technology?

To answer this question descriptive statistic was used to examine faculty members' perceptions of educational technology. Participants were asked to rate their agreement on a number of items. These items categorized perceptions of educational technology into five concepts: the first concept examines understanding the relationship between technology and teachers (items 20 -27); item 25 is a reverse item. The second concept examines perceiving educational technology as a tool of consumption or as a tool of creating and producing (items 28 -30); items 29 and 30 are reverse items. The third concept examines perceiving educational technology as a tool to raise student's test score or as a tool to provide better education (items 31 -33); item 31 is a reverse item. The fourth concept examines perceiving technology as a curriculum to be taught or technology as a tool to enhance digital competency (items 34 -36); items 34 and 36 are reverse items. The fifth concept examines understanding the role of teachers and administrations regarding the use of technology inside the school versus students' role (items 37 -39).

Participants' responses were measured using a six-point Likert scale: 1 = Strongly disagree, 2 = disagree, 3 = Somewhat disagree, 4 = Somewhat agree, 5 = agree, 6 = strongly agree. A higher score in one concept or domain means that the participants have a misconception about that concept. On the contrary, a lower score in one concept or domain means that the

participant holds a positive perception about that concept. The items of each category were computed into one variable (mean).

For the first concept, participants were asked to rate their agreement on statements such as; I do not know how to use technology in my teaching; I have concerns about the use of technology in the classroom; Educational technology in the future will replace teachers; Technology can solve any educational problem; and Using technology may distract students, therefore I don't use it in my classroom. The mean and standard deviation of the variables were calculated and reported in Table 9. As shown in Table 9, faculty members somewhat disagreed with the statements that reflect their perception about this concept ( $M = 3.0$ ,  $SD = .65$ ). Faculty's disagreeing indicates that faculty members to some extent hold a positive perception of the first concept "understanding the relationship between technology and teachers".

For the second concept, participants were asked to rate their agreement on the following statements; The main goal of using technology is to help students access existing knowledge; Faculty members should encourage students to use technology to create and form a new knowledge; and Faculty members should encourage students to use technology to communicate and share their ideas, experiences, and feelings. The mean and standard deviation of the variables were calculated and reported in Table 9. As shown in Table 9, faculty members somewhat disagreed about the statements that reflect their perception about this concept ( $M = 2.76$ ,  $SD = .48$ ). Somewhat disagree indicates that faculty members to some extent hold a positive perception of the second concept "educational technology as a tool of consumption or as a tool of creating and producing".

For the third concept, participants were asked to rate their agreement on the following statements; Faculty members should use technology to help students get high scores in tests; High scores mean better education; and the main goal of educational technology is to improve

students test score. The mean and standard deviation of the variable were calculated and reported in Table 9. As shown in Table 9, faculty members somewhat disagreed about the statements that reflect their perception about this concept ( $M = 3.1$ ,  $SD = .75$ ). Disagreeing in this context indicates that faculty members to some extent hold a positive perception of the third concept “educational technology as a tool to rise student’s test score or as a tool to provide better education”.

For the fourth concept, participants were asked to rate their agreement on the following statements; Students should learn to use technology in order to be prepared for tomorrow’s jobs; I perceive technology as a teaching tool; and in the university, we are teaching curricula that prepare our student for future jobs. The mean and standard deviation of the variable were calculated and reported in Table 9. As shown in Table 9, faculty members somewhat disagreed about the statements that reflect their perception about this concept ( $M = 3.2$ ,  $SD = .63$ ). Disagreeing here indicates that faculty members to some extent hold a positive perception of the fourth concept “technology as a curriculum to be taught or technology as a tool to enhance digital competency”.

For the fifth concept, participants were asked to rate their agreement on the following statements: I support the mandatory use of technology in teaching by universities, and the university and the faculty members should instruct students in detail on how to use technology in the classroom. The mean and standard deviation of the variable were calculated and reported in Table 9. As shown in Table 9, faculty members agreed about the statements that reflect their perception about this concept ( $M = 4.6$ ,  $SD = .89$ ). Agreeing indicates that faculty members have misconception about the fifth concept “the role of teachers and administrations regarding the use of technology inside the school versus students’ role”.

The overall trend of the findings of this question suggests that there is no definite answer so that we can conclude whether there is misconception or not. For the first four concepts the mean of the answer centered around 3 (somewhat disagree). Only fifth concept confirms trend toward the disagreement, meaning that, there is misconception or misunderstanding about this concept.

**Table 9.** Technology integration level

		Complementing_re placing	Consumption_ Creating	Test_scores_be ttere_ ducation	Curriculum_co mpetency	Topdown_bott omup
N	Valid	308	308	308	308	308
Mean		3.00	2.76	3.10	3.24	4.57
Std. Deviation		.65	.48	.75	.64	.89

**Question three:**

- a) Is there a significant relationship between the perceptions of educational technology and the translational level of technology integration by faculty members in Saudi Arabia?

Two multiple regression analysis tests were conducted to evaluate how well the perception concepts predicted the translational level of technology integration. The predictors were the five perception concepts, while the criterion variable was the translational level of technology integration. The researcher recoded the predictors into different variables. Therefore, a high number means the participant holds positive perceptions of educational technology and a lower number means that the participant has a misperception of educational technology. The first model included all five perception concepts as predictors. The linear combination of the five concepts was significantly predictive of the translational level of technology integration,  $F(5, 306) = 9.86, p < .001$ . The sample multiple correlation coefficient was .38, indicating that approximately 14 % of the variance of the translational level of technology integration in the sample can be accounted for by the linear combination of perception concepts (see Table 10).

The results of the standardized coefficients for this regression model indicate that three out of the five controlling variables were statistically significant, and two variables were statistically insignificant predictors of the criterion variable (top down vs bottom up and curriculum vs competency).

**Table 10.** Regression model 1 – Question 3-a

Model 1	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.38 <sup>a</sup>	.14	.13	.46	9.86	.001 <sup>b</sup>

Next, a multiple regression analysis was conducted after excluding the insignificant variables (top down vs bottom up and curriculum vs competency). As shown in Table 11, the linear combination of the three remaining variables (consumption vs creating, test score vs better education, and complementing vs replacing) was significantly predictive of the translational level of technology integration,  $F(5, 306) = 16.16, p < .001$ . The sample multiple correlation coefficient was .37, indicating that approximately 14 % of the variance of the translational level of technology integration in the sample can be accounted for by the linear combination of the three perception concept variables (consumption vs creating, test score vs better education, and complementing vs replacing).

**Table 11.** Regression model 2 – Question 3-a.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
2	.37 <sup>a</sup>	.14	.129	.46	16.69	.001 <sup>b</sup>

The regression coefficients for the second model in Table 12 included the three remaining predictor variables (consumption vs creating, test score vs better education, and complementing vs replacing) after excluding insignificant variables (consumption vs creating, test score vs better education, and complementing vs replacing). The results of the standardized

coefficients for the regression analysis for this model indicated that all three remaining variables (complementing vs replacing:  $\beta = .13$ ,  $t = 2.31$ .  $P = .022$ ,  $p < .05$ , consumption vs creating:  $\beta = .22$ ,  $t = 4.00$ .  $P = .001$ ,  $p < .05$ , top down vs bottoms up =  $-.24$ ,  $t = -4.56$ .  $P = .001$ ,  $p < .05$ .) were statistically significant predictors of the criterion variable.

**Table 12.** Regression Coefficients – Question 3-a

Model 2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.82	.19		25.75	.001
Complementing vs Replacing	.14	.06	.13	2.31	.022
Consumption vs Creating	.25	.06	.22	4.00	.001
Top down vs bottom up	-.24	.05	-.244	-4.56	.001

- b) Is there a significant relationship between the perceptions of educational technology and the transformational level of technology integration by faculty members in Saudi Arabia?

Two multiple regression analysis tests were conducted to evaluate how well the perception concepts predicted the transformational level of technology integration. The predictors were the five perception concepts, while the criterion variable was the transformational level of technology integration. The linear combination of the five concepts was significantly predictive of the translational level of technology integration,  $F(5, 306) = 11.82$ ,  $p < .001$ . The sample multiple correlation coefficient was .41, indicating that approximately 16 % of the variance of the translational level of technology integration in the sample can be accounted for by the linear combination of perception concepts (see Table 13). The results of the standardized coefficients for this regression model indicated that three out of the five controlling variables were statistically significant, and two variables were statistically

insignificant predictors of the criterion variable (test score vs better education and curriculum vs competency).

**Table 13.** Regression model 1 – Question 3-b

Model 1	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.41 <sup>a</sup>	.16	.15	.77	11.82	.001 <sup>b</sup>

Next, a multiple regression analysis was conducted after excluding the insignificant variables (test score vs better education and curriculum vs competency). As shown in Table 14, the linear combination of the three remaining variables (complementing vs replacing, consumption vs creating, and top down vs bottom up) was significantly predictive of the transformational level of technology integration,  $F(5, 306) = 16.16, p < .001$ . The sample multiple correlation coefficient was .37, indicating that approximately 14 % of the variance of the translational level of technology integration in the sample can be accounted for by the linear combination of the three perception concept variables (Consumption vs creating, top down vs bottom up, and complementing vs replacing).

**Table 14.** Regression model 2 – Question 3-b

Model 2	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
2	.40 <sup>a</sup>	.16	.15	.77	19.12	.001 <sup>b</sup>

The regression coefficients for the second model in Table 15 included the three remaining predictors variables (consumption vs creating, complementing vs replacing, and top down vs bottom up) after excluding insignificant variables (curriculum vs competency, test score vs better education). The results of the standardized coefficients for the regression analysis for this model indicated that all three remaining variables (complementing vs replacing:  $\beta = .13, t = 2.31, P =$

.022,  $p < .05$ , Consumption vs Creating:  $\beta = .22$ ,  $t = 4.00$ .  $P = .001$ ,  $p < .05$ , top down vs bottoms up =  $-.24$ ,  $t = -4.56$ .  $P = .001$ ,  $p < .05$ .) were statistically significant predictors of the criterion variable.

**Table 15.** Regression Coefficients – Question 3-b

Model 2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.81	.31		12.28	.001
Complementing vs Replacing	.31	.10	.17	3.10	.002
Consumption vs Creating	.42	.10	.22	4.10	.001
Top down vs bottom up	-.23	.09	-.26	-4.82	.001

- c) Is there a significant relationship between the perceptions of educational technology and the transcendent level of technology integration by faculty members in Saudi Arabia?

Two multiple regression analysis tests were conducted to evaluate how well the perception concepts predicted the transcendent level of technology integration. The predictors were the five perception concepts, while the criterion variable was the transcendent level of technology integration. The linear combination of the five perception concepts was significantly predictive of the translational level of technology integration,  $F(5, 306) = 6.95$ ,  $p < .001$ . The sample multiple correlation coefficient was .32, indicating that approximately 10 % of the variance of the transcendent level of technology integration in the sample can be accounted for by the linear combination of perception concepts. (see Table 16). The results of the standardized coefficients for this regression model indicated that four out of the five controlling variables were statistically significant, and one variable was statistically insignificant predictor of the criterion variable (test score vs better education).

**Table 16.** Regression model 1 – Question 3-c

Model 1	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.32 <sup>a</sup>	.10	.09	1.05	6.95	.001 <sup>b</sup>

Next, a multiple regression analysis was conducted after excluding the insignificant variable (test score vs better education). As shown in Table 17, the linear combination of the four remaining variables (complementing vs replacing, consumption vs creating, curriculum vs competency, and top down vs bottom up) was significantly predictive of the transcendent level of technology integration,  $F(5, 306) = 8.67, p < .001$ . The sample multiple correlation coefficient was .32, indicating that approximately 10% of the variance of the transcendent level of technology integration in the sample can be accounted for by the linear combination of the three perception concepts (consumption vs creating, top down vs bottom up, curriculum vs competency, and complementing vs replacing).

**Table 17.** Regression model 2 – Question 3-c

Model 2	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
2	.32 <sup>a</sup>	.10	.09	1.05	8.67	.001 <sup>b</sup>

The regression coefficients for the second model in Table 18 included the four remaining predictors (complementing vs replacing, consumption vs creating, curriculum vs competency, and top down vs bottom up). after excluding insignificant variable (test score vs better education). The results of the standardized coefficients for the regression analysis for this model indicated that all the four remaining variables (complementing vs replacing:  $\beta = .14, t = 2.44, P = .015, p < .05$ , consumption vs creating:  $\beta = .18, t = 3.17, P = .002, p < .05$ , curriculum vs competency:  $\beta = .12,$

$t = 2.26$ .  $P = .025$ ,  $p < .05$ , top down vs bottoms up =  $-.39$ ,  $t = -3.22$ .  $P = .001$ ,  $p < .05$ .) were statistically significant predictors of the criterion variable.

**Table 18.** Regression Coefficients – Question 3-c

Model 2	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.38	.13		3.49	.001
Complementing vs Replacing	.34	.14	.14	2.44	.015
Consumption vs Creating	.44	.14	.18	3.17	.002
curriculum vs competency	.56	.25	.12	2.26	.025
Top down vs bottom up	-.39	.12	-.18	-3.22	.001

In response to question three, the results suggested that there is a relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia. All regression models in this question were statistically significant, indicating that perception concepts are good at predicting the level of technology integration. The result indicated that faculty members who have positive perceptions of educational technology are more likely to have higher levels of educational technology integration.

### Chapter Summary

Chapter 4 presents the findings of the statistical analyses of the data that were collected in this study. There were 308 participants in the study. The chapter includes description of population and sampling, demographic description research questions, reliability analyses, findings of the research questions, and chapter summary.

## **CHAPTER V: DISCUSSION**

### **Introduction**

The purpose of this study was to identify perception of educational technology and technology integration level into teaching by faculty members and the relationship between perception and technology integration level. This chapter includes a review of research questions and hypotheses, and a discussion of major findings as related to the literature. The chapter concludes with a discussion of the limitations of the study, areas for future research, and a brief summary.

### **The purpose of the study**

The purpose of this study is to investigate the current faculty perception of educational technology. Another goal of this study is to determine the level of technology integration into teaching and learning by university faculty members. However, the main purpose of this study is to investigate whether there is a relationship between faculty perception of educational technology and the level of technology integration into teaching and learning. The research was conducted to answer the following research questions:

1. To what extent do faculty members in Saudi Arabia use, or integrate, technology in teaching?
2. What are Saudi university faculty members' perceptions of educational technology?
3. Is there a significant relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia?

The third question consists of the following sub-questions:

- g) Is there a significant relationship between the perceptions of educational technology and the translational level of technology integration by faculty members in Saudi Arabia?

- h) Is there a significant relationship between the perceptions of educational technology and the transformational level of technology integration by faculty members in Saudi Arabia?
- i) Is there a significant relationship between the perceptions of educational technology and the transcendent level of technology integration by faculty members in Saudi Arabia?

### **Research Hypotheses**

The following hypotheses were created in order to test the research questions:

H1. Saudi university Faculty members have a low-level of technology integration.

H2: Saudi university Faculty members have misperception of educational technology.

H43: There is a relationship between the perceptions of educational technology and educational technology integration by Saudi university Faculty members?

### **Interpretation of the Findings**

The study focused on measuring the current level of technology integration into teaching by Saudi university Faculty members. Additionally, the study examined faculty members' perceptions of educational technology and the relationship between perceptions and educational technology integration level. In other words, does perception matter in order to determine the level of technology integration into teaching? Three research questions, three sub-questions and three hypotheses were investigated by this study. Descriptive statistics were used to answer questions one and two, and multiple linear regression was used to answer question three.

After data were analyzed, it became evident that faculty members at Saudi universities have a quite moderate to high level of technology integration into teaching. Moreover, the results of data analysis show that faculty members at Saudi universities to a certain degree hold a positive perception of educational technology. In the regression analysis, the perception of

educational technology was significantly important in predicting the level of technology integration into teaching. Following are detailed findings discussions for each question.

**Question one:** To what extent do faculty members in Saudi Arabia use, or integrate, technology in teaching?

Participants were asked to rate their level of technology integration into teaching by responding to 19 items. These items categorized technology integration into three levels. Items 1- 7 represented the lower level of technology integration (Translational Level). Items 8 -14 represented the middle level of technology integration (Transformational Level). Items 15 - 19 represented the highest level of technology integration (Transcendent Level).

For the translational level, participants were asked to rate their agreement to statements such as: I use technology in my instruction to save time; I use technology to communicate with other faculty members, administration, and students; I use technology to reduce task-related errors; I use technology to test and grade students effectively; and I encourage my students to use technology to consume or use interactive content-related resources. In response to these statements, faculty members strongly agreed with the statements that categorized them into the translational level of technology integration ( $M = 5.35$ ,  $SD = .499$ ).

It was expected that faculty members were using educational technology in their teaching at the translational level because this is the most common way educational technology is used in education. However, even though the translational level is considered the lowest stage of educational technology integrations, it is still important and has a value such as using computer increases the speed, efficiency, or accuracy of administrative tasks, or using the Internet to help plan and prepare for instruction. The added value of the translational uses of technology is still relatively low compared to other technology uses (transformational and transcendent) (Magana, 2017).

The findings of the current study are consistent with those of Colbran & Al-Ghreimil (2013) who asked faculty members in Saudi university to indicate technology they used in their teaching. The four most frequently cited technology are: Email 79%, Internet 74%, Learning management system 47%, and electronic smart board 44%. According to Colbran & Al-Ghreimil (2013) there are variety of technologies being used, however, it is unclear if there is any systematic evaluation on how technology is used related to the improvements in the quality of teaching.

For the transformational level, participants were asked to rate their agreement to statements such as: I encourage my student to use technology to produce works that represent their learning/knowledge; I encourage my student to use technology to accomplish things or Educational gains or educational objective that they could not have done without it; I use technology to track my students educational progress; I encourage my students to use technology to create tutorials/learning materials; and I encourage my students to engage in social media learning discussion. In response to these statements, faculty members agreed with the statements that categorized them into the transformational level of technology integration ( $M = 4.8$ ,  $SD = .84$ ).

For the transcendent level, participants were asked to rate their agreement to statements such as: I encourage my students to use technology to solve a real-life problems that matter to them; I encourage my students to use technology to organize a group work in order to achieve common goals; I encourage my students to use technology to engage in social entrepreneurship tasks that are driven by authentic passion and need; and I encourage my students to use technology to evaluate their implementation of the digital solutions to an authentic problem. In response to these statements, faculty members somewhat agreed to the statements that categorized them into the transcendent level of technology integration ( $M = 4.6$ ,  $SD = .84$ ).

Contrary to expectations, the results of the transforaminal level and the transcendent level indicate that, most faculty members are using technology in their teaching at the middle and highest level of technology integration. Also, the findings of the current study do not support the previous literature which suggested that faculty members mostly use technology such as word processing and email for communication and research rather than using technology such as the use of multimedia, course management system, asynchronous communication and social media for instruction (Kazley, A., Annan, D., Carson, N., Freeland, M., Hodge, A., Seif, G., & Zoller, J. (2013).

There are several possible explanations for this result. One explanation is that this study adopted a self-report as a method to collect information about the participants. Self-report is considered one of the most common measures about individuals' behavior or opinion. Even though there are many strengths of using self-reports to measure someone's opinion or behavior, there are numbers of weaknesses. One common weakness of self-report is that people are often biased when they report on their opinion or behavior. For instance, consciously or unconsciously, individuals more likely respond in a way that presents their experiences or opinion in a more favorable and acceptable light (McDonald, 2008). That might be an explanation for the responses in this question that reflected a high level of technology integration into teaching by faculty members.

There is, however, another possible explanation which is that this result might be a real reflection of the fact that educational technology integration into teaching is at middle and high level in Saudi universities. The high level of educational technology integration into teaching by faculty members could be attributed to the fact that the use of technology in teaching and learning in Saudi Arabia began in the early 1990s. The Ministry of Higher Education (MOHE) adopted many ambitious projects that aimed at adopting e-learning and its applications in

academic institutions. In 1996, MOHE established the Computer and Information Centre (CIC) to offer information and communication technology (ICT) services to schools and academic centers. In 2000 and 2002 MOHE established a computer project followed by schools' net project. These projects aimed at connecting school and educational directorates by means of a wide area network. MOHE, also, initiated several projects in collaboration with local and international companies, such as Intel, that aimed to producing an electronic version of curricula of all official government k-12 school and other educational tools, such as multimedia library and electronic class system (Aljaber, 2018).

In light of the government's efforts to support the adoption of technology in education, many Saudi universities are frequently developing projects to provide adequate (ICT) infrastructure and electronic learning materials for higher education students. Also, many universities in Saudi Arabia such as King Saud University (KSU), King Abdul Aziz University (KAU), Al-Baha University, Taiba University, Qassim University, King Khalid University (KKU) and Madinah Islamic University have formal agreements with the NCeDL to introduce e-learning schemes into their curricula (Al-jaber, 2018). In 2003, King Fahad University of Petroleum and Minerals (KFIPM) established the e-learning center, which offers integrated access to online resources and provides more than 80 online courses in different subjects such as engineering, sciences and industrial managements in both English and Arabic (AL-Khalifa, 2009). King Khalid University established its deanship for e-learning and Distance Learning in 2006 to help and support university faculty to develop an online course and to provides 21st century learning to over 70.000 students (Al-jaber, 2018).

It is also possible that, the change the study has noticed is a change in technology only, due to the large government spending on technical infrastructural in higher education. While educational pedagogy remains traditional. It is noted that, technology is always at the forefront of

educational planning at the expense of the comprehensive perspective of educational change, which includes all components of the educational domains. The establishment of modern educational reform based on technology is not wrong, but the mistake that has been repeated again and again with each new technology is that thinking technology alone can bring about the desired change.

**Question Two:** What are Saudi university faculty members' perceptions of educational technology?

To answer this question participants were asked to rate their agreement to a number of items. These items categorized perceptions of educational technology into five concepts. The first concept examines understanding the relationship between technology and teachers. The second concept examines perceiving educational technology as a tool of consumption or as a tool of creating and producing. The third concept examines perceiving educational technology as a tool to rise student's test score or as a tool to provide better education. The fourth concept examines perceiving technology as a curriculum to be taught or technology as a tool to enhance digital competency. The fifth concept examines understanding the role of teachers and administrations regarding the use of technology inside the school versus students' role.

For the first concept, participants were asked to rate their agreement to statements that examine their understanding of the relationship between technology and teachers. Faculty members somewhat disagreed to the statements that reflect their perception about this concept ( $M = 3.0$ ,  $SD = .65$ ). Disagreeing in this matter indicates that faculty members to some extent, hold a positive perception of this concept "understanding the relationship between technology and teachers".

The results of this concept indicated that there is an understanding of the nature of the relationship between technology and teachers. However, it is not definite or clear. The lack of

clarity in understanding the relationship between teachers and technology is rational for a number of reasons; some teachers believe when using technology in the classroom, students might be exposed to inappropriate content on the internet, encountering cyberbullying, or being distracted. Moreover, at the root of the educational system teacher is the cornerstone and the most important factor in the education process, so teachers fear that technology might reduce their importance and sense of authority and cause them to lose the territory of teaching to technology (Zhao, Zhang, Lei, & Qiu, 2015).

For the second concept, participants were asked to rate their agreement to statements that examines perceiving educational technology as a tool of consumption or as a tool of creating and producing. Faculty members somewhat disagreed to the statements that reflect their perception about this concept ( $M = 2.76$ ,  $SD = .48$ ). Their disagreement indicates that faculty members to some extent hold a positive perception of the second concept.

The result of this concept indicated that there is an understanding of technology as a tool of consumption or a tool of creation and production. However, it is not definite or clear. This could be related to understanding the previous concept, the relationship between teachers and technology. The good relationship between any two elements requires a clear definition of roles and tasks and thus achieving harmony and complementarity in the learning environment.

For the third concept, participants were asked to rate their agreement to statements that examines perceiving educational technology as a tool to rise student's test score or as a tool to provide better education. Faculty members somewhat disagreed to the statements that reflect their perception about this concept ( $M = 3.1$ ,  $SD = .75$ ). Disagreeing indicates that faculty members to some extent hold a positive perception of the third concept. However, there is some ambiguity of understanding this concept because the actual practices in education indicates that.

This ambiguity may be explained by the fact that testing as a tool of evaluation has been deeply established in educational system, therefore, some believe that it is necessary and inevitable.

For the fourth concept, participants were asked to rate their agreement to statements that examines perceiving technology as a curriculum to be taught or technology as a tool to enhance digital competency. Faculty members somewhat disagreed to the statements that reflect their perception about this concept ( $M = 3.2$ ,  $SD = .63$ ). Disagreeing indicates that faculty members to some extent hold a positive perception of the fourth concept.

For the fifth concept, participants were asked to rate their agreement to statements that examines understanding the role of teachers and administrations regarding the use of technology inside the school versus students' role. Faculty members agreed to the statements that reflect their perception about this concept ( $M = 4.6$ ,  $SD = .89$ ). Agree indicates that faculty members have misconception about the fifth concept "the role of teachers and administrations regarding the use of technology inside the school versus students' role".

The overall trend of the findings of this question suggested that there is no definite answer so that we can conclude whether there is misconception or not. For the first four concepts the mean of the answer centered around 3 (somewhat disagree). Only the fifth concept confirmed trend toward the disagreement, meaning that, there is misconception or misunderstanding about this concept.

In contrary to the hypothesis, this result showed that there is kind of awareness about the future of educational technology, and about the important concepts that are necessary to challenge the traditional thinking, practices and policies of educational technology. The reason behind this can be attributed to the effort of Saudi universities to develop education, especially in the development and training of faculty members. As the majority of Saudi universities have

specialized centers for the development and training of faculty members. One focus of the training of faculty members is the use of technology in education.

However, the result showed that faculty members in Saudi universities have misconception about who technology should serve? Should technology in the classroom be used to help teachers' teaching or students' interests.? Why technology is being used outside the classroom more than inside the classroom? The degree of freedom students should have in their technology practice inside the classroom. All of these questions refer us to the issues of teacher-technology relationship; who should control the educational process; the fear of losing control over the instructional process; and the fear that the freedom to use technology in the classroom might distract students' attention and exposure them to an inappropriate material. These issues could be crucial reasons behind the controlling mindset that still dominating educational system.

**Question three:** Is there a significant relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia?

The aim of this question is to examine how well the perception concepts predicted the level of technology integration into teaching by faculty members. The predictors were the five perception concepts, while the criterion variable was the translation level of technology integration. Three separate multiple regression analyses were conducted to evaluate the association between the five perception concepts and each technology integration levels (the translational, the transformational, and the transcendence level)

In response to question three, the results suggested that there is a significant relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia. All regression models in this question were statistically significant indicating that, perception concepts are good at predicting the level of technology integration. The results indicated that faculty members who have a positive perception of

educational technology are more likely to have higher levels of educational technology integration.

Most contributions to the regression models came from the independent variable top down vs bottom up, followed by the independent variable consumption vs creation. While the contribution of the independent variable test score vs better education was not significant in all models, the independent variable curriculum vs competency was only significant in the third model when predicting the transcendent level of technology integration.

As mentioned in the literature review, faculty members' beliefs, attitudes, and perceptions of education technology was found to be a fundamental factor in the level and quality of technology integration in the classroom (Ottenbreit-Leftwich et al., 2010). Also, the literature suggested that, the beliefs teachers hold affect their practice in the classroom, those who hold more positive attitudes toward educational technology are more likely to use technology in delivering curricular contents (Mueller, Wood, Willoughby, Ross, & Specht, 2008), restructuring learning goals (Miranda and Russell, 2012) and adopting more student-centered and cognitively stimulating instructional approaches (Hixon and Buckenmeyer, 2009, Hsu, 2016).

An important contribution of this study is the development of the scale to assess faculty member level of technology integration and their perception of educational technology. The T3 Framework of technology integration was used within the context of the study to measure faculty members technology integration level. While, concepts from the book *Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes* by Zhao, Zhang, Lei, & Qiu, (2015) was used within the context of the study to measure faculty members perception of educational technology.

The researcher created an initial item pool to develop the scale by using all of the T3 framework and the book five concepts competencies and indicators. A total of 47 items were written down in the item pool. After piloting the scale, the number of items from the item pool was reduced to 38. The values of Cronbach's alpha coefficient for the individual construct of the scale ranged between .75 and .93.

However, the researcher thinks that as this scale is first developed and used in this study, and as it based on a barely new framework, further steps are suggested to make it more valid and reliable. First, increase the number of items in some constructs such as the construct to measure concept four (Curriculum Vs competency) and concept five (Top down vs bottom up). Second, conduct a pilot test on the scale by choosing participants from a wide range of universities and across multiple specialties. Third, conduct exploratory and confirmatory factor analysis in order to explain correlation among items, therefore, reduce the number of items in some constructs.

### **Implications**

The purpose of this study was to determine the current level of educational technology integration into teaching by Saudi university faculty members and to explore faculty members' perception of educational technology. Also, the study aimed to examine the relationship between perception of educational technology and educational technology integration levels. The study found that faculty members' overall technology integration level was moderate-to-high, and Saudi university faculty members relatively have a good understanding of the perception of educational technology. The study also discovered that there is statistically significant relationship between perception of educational technology and educational technology integration levels.

This study revealed a satisfactory amount of educational practices related to technology integration in Saudi universities. However, I believe that these practices are scattered and are

individual efforts and initiatives. These individual efforts need to be part of a comprehensive strategic plan that bring about fundamental changes in higher education systems. This strategic plan is supposed to reshape universities' instruction into more student-centered instruction. It should also transform traditional instruction, which for decades had standardized education organizational practice by dividing time and space, classifying students and allocating them to classrooms.

Using technology in a transformative way must be part of this comprehensive strategic plan to reform education. In other words, technology must be fully integrated into university improvement plans, curriculum plans, and career growth plans. In order to transform education, we need to define technology as a tool to accomplish substantive needs, and not define technology as isolated new goals. Additionally, we should understand that transformative learning environment consists of a variety of elements as an ecosystem, each element has its own niche and its own role to play. "The ultimate goal is to tap into the advantage of both human beings and technology and therefore provide an optimal learning environment for learners" (Zhao, Zhang, Lei, & Qiu, 2015).

One of the requirements of the comprehensive strategic plan to transform education is to eliminate the traditional pattern of thinking about utilizing educational technology, which is using technology for teaching and transforming educational content in the same way as the teacher does. This is not enough to make a real difference and transform education, but rather it devotes the traditional concept of technology, which means that the role of technology is to transfer knowledge. Recent and distant history showed that this role of technology did not transform education. It just exchanges the roles between technology and teachers (Janassen, et al., 1999).

This finding has important implications for developing professional development programs for faculty members, especially those related to educational technology. The professional development program needs to be conducted about effective faculty training strategies that aim to create transformational learning experiences rather than focusing on technical skills. To create transformational learning experiences, professional development programs need to focus on creating active learning environments that include collaborative group discussion, collaborative work groups, simulations, examples, case studies, and first-hand experiences.

In order to establish more effective professional development programs university, need sponsored workshops that are linked with specific goals, for specific faculty as a form of individualized training, facilitate communication, coaching, and sharing between faculty members. The trainer or facilitators of these programs need to be someone who is familiar with educational technology pedagogical strategies and understand the learning processes. Also, peer-to-peer training and mentoring can be sponsored by department workshops. Also, peer-to-peer training and mentoring can be sponsored by department workshops.

### **Limitations of the Study**

1. One of the limitations of this study was that, most of the participants were from one university (King Abdul-Aziz University). But it is the hope that the result could be generalized to include all Saudi universities. The hope came from the fact that, all Saudi universities are governed and financed by Saudi government, and all follow the same rules and regulations.
2. Multiple linear regression analysis was conducted to answer question three, where five independent variables (perception's concepts) predicted one dependent variable (one of the educational technology integration level, the translational level, the transformational

level, and the transcendent level). Another an appropriate statistical analysis to be used in this study is canonical regression, where there are a set of predictors and a set of criterions.

3. The survey used in this study was developed by the researcher and used for the first time and translated into another language (Arabic), so some questions might be unclear to the participant without the researcher's explanation.

### **Suggestions for Future Research**

The theoretical framework and models for this study are relatively new. The T3 technology integration model by Sony Magana was introduced in 2017. The perception concepts were extracted from the book *Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes* by Young Zhao et. al, which was published in 2015. Therefore, conclusion of this study needs to be retested and re-examined through future studies. Following are several suggestions for future research:

1. The survey of this study was developed executively and first used in this study. Therefore, it needs to be reviewed and improved for future studies to ensure better and more accurate results.
2. Enlarge the population under study to include the majority of Saudi universities and to include statistically random samples rather than assuming this study can be generalized across all Saudi universities.
3. Conduct mixed method, quantitative and qualitative study, that includes observation and interview with participants to measure the level of technology integration and the perception of educational technology.
4. Conduct a comparison study of the relationship between technology integration levels and the perception of educational technology between faculty members in Saudi

universities and faculty members in American universities (or any university in a developed country).

5. Conduct the study on k-12 education.
6. Conduct a study to measure the level of technology integration into teaching by faculty members from universities students' perspectives.

## **Conclusion**

In order to use technology to transform education we need to examine the prevalent mindset of faculty members regarding the use of technology in teaching and its relation to the level of technology integration. The purpose of this study was to identify perception of educational technology and technology integration level into teaching by Saudi university faculty members and investigating the relationship between perception and technology integration level.

The data of this study were organized, collected, tested, and analyzed through quantitative research methods. The participants of this study were faculty members at Saudi universities. The sample size was 308 male and female faculty members. The results of this study showed the following:

1. Saudi university faculty members remarkably use technology in their teaching at the translational level of the T3 technology integration model ( $M = 5.35$ ,  $SD = .499$ ).
2. Saudi university faculty members use technology in their teaching at the transformational level of the T3 technology integration model ( $M = 4.8$ ,  $SD = .84$ ).
3. Saudi university faculty members to some extent use technology in their teaching at the transcendent level of the T3 technology integration model ( $M = 4.6$ ,  $SD = .84$ ).

4. Saudi university faculty members to some extent hold a positive perception of the first concept “understanding the relationship between technology and teachers” (M = 3.0, SD = .65).
5. Saudi university faculty members to some extent hold a positive perception of the second concept “educational technology as a tool of consumption or as a tool of creating and producing” (M = 2.76, SD = .48).
6. Saudi university faculty members to some extent hold a positive perception of the of the third concept “educational technology as a tool to rise student’s test score or as a tool to provide better education” (M = 3.1, SD = .75).
7. Saudi university faculty members to some extent hold a positive perception of the of the forth concept “technology as a curriculum to be taught or technology as a tool to enhance digital competency” (M = 3.2, SD = .63).
8. Saudi university faculty members have misconception about the fifth concept “the role of teachers and administrations regarding the use of technology inside the school versus students’ role” (M = 4.6, SD = .89).
9. There is a relationship between the perceptions of educational technology and educational technology integration by faculty members in Saudi Arabia.  
Generally speaking, all regression models in this study were statistically significant indicating that, perception concepts are good at predicting the level of technology integration into teaching.

## References

- Abrahams, D. A. (2010). Technology adoption in higher education: A framework for identifying and prioritizing issues and barriers to adoption of instructional technology. *Journal of Applied Research in Higher Education*, 2(2), 34-49.
- Al-Khalifa, H. S. (2009). The state of distance education in Saudi Arabia. *eLearning*, 2009(10).
- Alharthi, A., Alassafi, M. O., Walters, R. J., & Wills, G. B. (2017). An exploratory study for investigating the critical success factors for cloud migration in the Saudi Arabian higher education context. *Telematics and Informatics*, 34(2), 664-678.
- Aljaber, A. (2018). E-learning policy in Saudi Arabia: Challenges and successes. *Research in Comparative and International Education*, 13(1), 176-194.
- Amiel, T., & Reeves, T. C. (2008). Design-based research and educational technology: Rethinking technology and the research agenda. *Journal of educational technology & society*, 11(4), 29-40.
- Becker, H. J. (1994). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Journal of Research on Computing in Education*, 26(3), 291-321.
- Blin, F., & Munro, M. (2008). Why hasn't technology disrupted academics' teaching practices? Understanding resistance to change through the lens of activity theory. *Computers & Education*, 50(2), 475-490.
- Bottino, R. M., Forcheri, P., & Molfino, M. T. (1998). Technology transfer in schools: from research to innovation. *British Journal of Educational Technology*, 29(2), 163-172.

- Broad, M., Matthews, M., & McDonald, A. (2004). Accounting education through an online-supported virtual learning environment. *Active Learning in Higher Education*, 5(2), 135-151.
- Brownlee, P. P. (2000). Effecting transformational institutional change. *The National Academy Newsletter*, 1(3).
- Burbules, N. C., & Callister Jr, T. A. (2000). Watch IT: The promises and risks of information technologies for education. *Boulder: Westview Press. Google Scholar*.
- Calderhead, J. (1996). Teachers: Beliefs and knowledge. *Handbook of Educational Psychology*. New York: Macmillan Library Reference.
- Cavanagh, S (2017, Jan 25). A Growing Need for Ed-Tech—and Teacher Training—in the Middle East. Retrieved from <https://marketbrief.edweek.org/marketplace-k-12/growing-need-ed-tech-teacher-training-middle-east/>
- Chen, Y. F., & Peng, S. S. (2008). University students' Internet use and its relationships with academic performance, interpersonal relationships, psychosocial adjustment, and self-evaluation. *Cyberpsychology & Behavior*, 11(4), 467-469.
- Chou, C. (2001). Internet heavy use and addiction among Taiwanese college students: an online interview study. *Cyber Psychology & Behavior*, 4(5), 573-585.
- Clark, R. E. (1983). Reconsidering research on learning from media. *Review of educational research*, 53(4), 445-459.
- Colbran, S., & Al-Ghreimil, N. (2013). The role of information technology in supporting quality teaching and learning. In *Higher Education in Saudi Arabia* (pp. 73-82). Springer, Dordrecht.
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS quarterly*, 189-211.

- Dede, C. (1998). *Learning with Technology. 1998 ASCD Yearbook*. Association for Supervision and Curriculum Development, 1250 N. Pitt St., Alexandria, VA 22314-1453
- Dickard, N. (2003). The Sustainability Challenge: Taking EdTech to the Next Level.
- Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational technology research and development*, 47(4), 47-61.
- Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educational technology research and development*, 53(4), 25-39.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of research on Technology in Education*, 42(3), 255-284.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423-435.
- Frey, B. (2006). *Statistics hacks: Tips & tools for measuring the World and beating the odds*. " O'Reilly Media, Inc."
- Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education*, 50(3), 906-914.
- Fullan, M. & Stiegelbauer, S.M. (1991). *The New Meaning of Educational Change*. New York: TC Press.

- Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American educational research journal*, 38(4), 915-945.
- Geoghan, W. (1994). Stuck at the barricades: Can information technology really enter the mainstream of teaching and learning?
- Ginserb R, McCormick V (1998) Computer use in effective schools. *J Staff Dev* 19(1):22–25
- Goodchild, T. (2018). Does technology really enhance nurse education?
- Gray, L., Thomas, N., & Lewis, L. (2010). Teachers' Use of Educational Technology in US Public Schools: 2009. First Look. NCES 2010-040. *National Center for Education Statistics*.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational technology research and development*, 55(3), 223-252.
- Hixon, E., & Buckenmeyer, J. (2009). Revisiting technology integration in schools: Implications for professional development. *Computers in the Schools*, 26(2), 130-146.
- Hsu, P. S. (2016). Examining current beliefs, practices and barriers about technology integration: A case study. *TechTrends*, 60(1), 30-40.
- Hu, W. (2007). Seeing no progress, some schools drop laptops. *The New York Times*, 4(05).
- Jonassen, David, Peck, Kyle, & Wilson Brent (1999). Learning with Technology: A Constructivist Perspective. Prentice Hall Inc., NJ.
- Kagan, D. M. (1992). Professional growth among preservice and beginning teachers. *Review of educational research*, 62(2), 129-169.

- Kazley, A. S., Annan, D. L., Carson, N. E., Freeland, M., Hodge, A. B., Seif, G. A., & Zoller, J. S. (2013). Understanding the use of educational technology among faculty, staff, and students at a medical university. *TechTrends*, 57(2), 63-70.
- Keengwe, J., Onchwari, G., & Wachira, P. (2008). Computer technology integration and student learning: Barriers and promise. *Journal of science education and technology*, 17(6), 560-565.
- Keller, C. (2005). Virtual learning environments: three implementation perspectives. *Learning, media and technology*, 30(3), 299-311.
- King, K. P. (2002). Educational technology professional development as transformative learning opportunities. *Computers & Education*, 39(3), 283-297.
- Kirkup, G., & Kirkwood, A. (2005). Information and communications technologies (ICT) in higher education teaching—a tale of gradualism rather than revolution. *Learning, Media and Technology*, 30(2), 185-199.
- Kirkwood, A., & Price, L. (2013). Missing: Evidence of a scholarly approach to teaching and learning with technology in higher education. *Teaching in Higher Education*, 18(3), 327-337.
- Korte, W. B., & Hüsing, T. (2006). Benchmarking access and use of ICT in European schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European countries. *empirical*, 1, 0.
- Lei, J., & Zhao, Y. (2007). Technology uses and student achievement: A longitudinal study. *Computers & Education*, 49(2), 284-296.
- Levy, F., & Murnane, R. J. (2013). Dancing with robots: Human skills for computerized work. *Washington, DC: Third Way NEXT*.

- Livingstone, Sonia. (2012). Critical Reflections on the Benefits of ICT in Education. *Oxford Review of Education*, 38(1), 9-24.
- Lowther, D. L., Inan, F. A., Daniel Strahl, J., & Ross, S. M. (2008). Does technology integration “work” when key barriers are removed? *Educational Media International*, 45(3), 195-213.
- Magaña, S. (2017). *Disruptive classroom technologies: A framework for innovation in education*. Corwin Press.
- Marcinkiewicz, H. R. (1993). Computers and teachers: Factors influencing computer use in the classroom. *Journal of research on computing in education*, 26(2), 220-237.
- Lei, J., & Zhao, Y. (2007). Technology uses and student achievement: A longitudinal study. *Computers & Education*, 49(2), 284-296.
- McDonald, J. D. (2008). Measuring personality constructs: The advantages and disadvantages of self-reports, informant reports and behavioral assessments. *Enquire*, 1(1), 1-19.
- Minschew, L., & Anderson, J. (2015). Teacher self-efficacy in 1: 1 iPad integration in middle school science and math classrooms. *Contemporary Issues in Technology and Teacher Education*, 15(3), 334-367.
- Miranda, H. P., & Russell, M. (2012). Understanding factors associated with teacher-directed student use of technology in elementary classrooms: A structural equation modeling approach. *British Journal of Educational Technology*, 43(4), 652-666.
- Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers & education*, 51(4), 1523-1537.

- Nicolle, P. S., & Lou, Y. (2008). Technology adoption into teaching and learning by mainstream university faculty: A mixed methodology study revealing the “how, when, why, and why not”. *Journal of Educational Computing Research*, 39(3), 235-265.
- Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers & education*, 55(3), 1321-1335.
- Paige, R., Hickok, E., & Patrick, S. (2004). Toward a new golden age in American education: How the internet, the law, and today’s students are revolutionizing expectations. *Washington, DC: US Department of Education*.
- Richtel, M. (2011). In classroom of future, stagnant scores. *The New York Times*, 3(9).
- Rogers, E. M. (1995). *Diffusion of innovations*. New York, NY: The Free Press.
- Rudd, P., Teeman, D., Marshall, H., Mundy, E., White, K., Lin, Y., . . . & Cardozo, V. (2009). Harnessing technology schools survey 2009: Analysis report.
- School of the Future: How will EdTech impact the education sector in the Middle East? (2018, June 29) Retrieved from <https://valustrat.com/school-of-the-future-how-will-edtech-impact-the-education-sector-in-the-middle-east>.
- Selwyn, N. (2007). The use of computer technology in university teaching and learning: a critical perspective. *Journal of computer assisted learning*, 23(2), 83-94.
- Senik, R., & Broad, M. (2011). Information technology skills development for accounting graduates: Intervening conditions. *International Education Studies*, 4(2), 105.
- Sheard, M., & Ahmed, J. (2007). Engaging the ‘Xbox generation of learners’ in Higher Education.
- Slavin, R. E. (1992). *Research methods in education*. Allyn & Bacon.

- Summers, J. J., Waigandt, A., & Whittaker, T. A. (2005). A comparison of student achievement and satisfaction in an online versus a traditional face-to-face statistics class. *Innovative Higher Education, 29*(3), 233-250.
- Surry, D. W. (1997). Diffusion theory and instructional technology. In *Proceedings of the Annual Conference of the Association for Educational Communications and Technology* (pp. 1-12).
- Tabata, L. N., & Johnsrud, L. K. (2008). The impact of faculty attitudes toward technology, distance education, and innovation. *Research in higher education, 49*(7), 625.
- Thornburg, D. (2013). From the campfire to the holodeck: Creating engaging and powerful 21st century learning environments.
- Tsai, C. C., & Chai, C. S. (2012). The “third”-order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology*.
- Wang, B. (2018). Disruptive Classroom Technologies. *EURASIA Journal of Mathematics, Science and Technology Education, 14*(5), 2039-2041.
- Watty, K., McKay, J., & Ngo, L. (2016). Innovators or inhibitors? Accounting faculty resistance to new educational technologies in higher education. *Journal of Accounting Education, 36*, 1-15.
- York, R. O. (2008). Comparing three modes of instruction in a graduate social work program. *Journal of Social Work Education, 44*(2), 157-172.
- Zemsky, R., & Massy, W. F. Thwarted Innovation: What Happened to E-Learning and Why (West Chester, Penn.: The Learning Alliance at the University of Pennsylvania, 2004).

Zhao, Yong; Zhang, Gaoming; Lei, Jing; Qiu, Wei (2015). Never Send a Human to Do a Machine's Job: Correcting the Top 5 EdTech Mistakes (Page 1). SAGE Publications. Kindle Edition.

Zheng, B., Warschauer, M., Lin, C. H., & Chang, C. (2016). Learning in one-to-one laptop environments: A meta-analysis and research synthesis. *Review of Educational Research*, 86(4), 1052-1084.

## Appendix

### Appendix A: Study Survey

#### Section 1. Adoption

**This section investigates your level of technology integration into teaching and learning. Please indicate the extent to which you agree or disagree with the following statements.**

To what extent do you agree or disagree with the following statements.

(1 = Strongly disagree, 2 = disagree, 3 = Somewhat disagree, 4 = Somewhat agree, 5 = Agree, 6 = Strongly agree).

		1	2	3	4	5	6
1	I use technology in my instruction to save time. أستخدم التقنية في التدريس لحفظ الوقت.						
2	I use technology to communicate with other faculty, administration, and students. أستخدم التقنية للتواصل مع الإدارة، وأعضاء هيئة التدريس والطلاب.						
3	I use technology to reduce task-related errors. (Such as mistakes in student scores). أستخدم التقنية للتقليل من الأخطاء المتعلقة بالمهمة التعليمية (مثل، أخطاء رصد درجات الطلاب)						
4	I use technology to present new content information. أستخدم التقنية لعرض معلومات جديدة عن محتوى المادة العلمية						
5	I use technology to test and grade students effectively.						

	أستعمل التقنية لاختبار الطلاب ورصد درجاتهم بفعالية						
6	I use internet websites and other digital forms as course resources. أستخدم مواقع الانترنت ووسائل تقنية أخرى كمراجع للمادة التي أدرسها.						
7	I encourage my student to use technology to consume or use interactive content-related resources. For our targeted content. أحفز طلابي لاستخدام وسائل تقنية تفاعلية كمراجع للمادة العلمية التي أدرسها						
8	I encourage my student to use technology to produce works that represent their learning/knowledge. أحفز طلابي لاستخدام التقنية لإنتاج أعمال تعكس معارفهم ومستوى تعلمهم.						
9	I encourage my student to use technology to accomplish things or Educational gains or educational objective that they could not have done without it. أحفز طلابي لاستخدام التقنية لتحقيق أهداف تعليمية لا يمكن تحقيقها بدون استخدام التقنية						
10	I use technology to track my students educational progress. أستخدم التقنية لمتابعة تطور طلابي التعليمي						

11	I encourage my student to use technology to create tutorials/learning materials. أحفز طلابي لاستخدام التقنية لإنتاج مواد تعليمية مساعدة.						
12	I encourage my student to use technology for brainstorming activities. أحفز طلابي لاستخدام التقنية في أنشطة العصف الذهني						
13	I encourage my students to engage in social media learning discussion. أحفز طلابي للانخراط في النقاشات العلمية على وسائل التواصل الاجتماعي						
14	I encourage my students to create digital portfolio that shows their learning development overtime. أحفز طلابي لإنشاء ملف تعليمي إلكتروني يعكس تطورهم التعليمي والمعرفي						
15	I encourage my students to use technology to solve real-life problem that matter to them. أحفز طلابي لاستعمال التقنية لإيجاد حلول لمشكلات حقيقية لهم اهتمام خاص بها						
16	I encourage my students to use technology to organize group work in order to achieve common goals. أحفز طلابي لاستعمال التقنية لتنظيم أعمال جماعية تقودهم لتحقيق أهداف مشتركة.						
17	I encourage my students to use technology to engage in social						

	entrepreneurship tasks that are driven by authentic passion and need. أحفز طلابي لاستعمال التقنية لإنجاز أعمال ريادية مجتمعية يهتمون بها ويحتاجون إليها.						
18	I encourage my students to use technology to imagine, design, and create new tools or platforms as solutions to authentic problems. أحفز طلابي لاستعمال التقنية لتخيل وتصميم وإنتاج أدوات وحلول لمشاكل واقعية.						
19	I encourage my students to use technology to evaluate their implementation of the digital solutions to an authentic problem. أحفز طلابي لاستعمال التقنية لتقييم نتائج تطبيقهم للحلول التقنية التي أنتجوها للمشاكل الواقعية.						

## Section 2: Perception

This section investigates your perception of educational technology. Please indicate the extent to which you agree or disagree with the following statements.

To what extent do you agree or disagree with the following statements.

(1 = Strongly disagree, 2 = disagree, 3 = Somewhat disagree, 4 = Somewhat agree, 5 = Aisagree, 6 = Strongly agree).

		1	2	3	4	5	6
20	I do not know how to use technology in						

	my teaching. أنا لا أعرف كيفية استخدام التقنية في عملية التدريس.						
21	I have concerns about the use of technology in the classroom. عندي تحفظات على استخدام التقنية داخل الفصل الدراسي						
22	Educational technology in the future will replace teachers. تقنيات التعليم سوف تكون بديلا للمعلمين في المستقبل						
23	I rank and compare technology tools to find out which is better in instruction. أقوم بمقارنة وترتيب تقنيات التعليم المتوفرة للبحث عن الأفضل لاستخدامه في عملية التدريس.						
24	Technology can solve any educational problem. التقنية تستطيع حل أي مشكلة تعليمية						
25	Technology can perform educational tasks that faculty members cannot do. التقنية تقوم بأدوار تعليمية لا يستطيع أعضاء هيئة التدريس القيام بها.						
26	Using technology may distract students, therefore I don't use it in my classroom. استخدام التقنية قد يشتت انتباه الطلاب لذلك أفضل عدم استعمالها داخل الفصل الدراسي						
27	Using technology in the classroom can						

	<p>increase students' exposure to inappropriate content, therefore, I do not use it in my classroom .</p> <p>استخدام التقنية داخل الفصل الدراسي قد يعرض الطلاب لمواد غير مناسبة لذلك أفضل عدم استخدامها داخل الفصل الدراسي.</p>						
28	<p>The main goal of using technology is to help students access existing knowledge.</p> <p>الهدف الأساسي من استخدام تقنيات التعليم هو مساعدة الطلاب للوصول لمصادر المعلومات الحالية المتوفرة على الإنترنت.</p>						
29	<p>Faculty members should encourage students to use technology to create and form new knowledge.</p> <p>ينبغي لأعضاء هيئة التدريس أن يحفزوا طلابهم لاستخدام التقنية لإنتاج معرفة جديدة.</p>						
30	<p>Faculty members should encourage students to use technology to communicate and share their ideas, experiences, and feelings.</p> <p>ينبغي لأعضاء هيئة التدريس أن يحفزوا طلابهم لاستخدام التقنية للتواصل فيما بينهم ومشاركة الأفكار والخبرات والمشاعر.</p>						
31	<p>Faculty members should use technology to help students get high scores in tests.</p> <p>ينبغي لأعضاء هيئة التدريس أن يستخدموا التقنية لمساعدة الطلاب على الحصول على درجات عالية</p>						

	في الاختبارات.						
32	High scores mean better education. التعليم الجيد يعني الحصول على درجات مرتفعة						
33	The main goal of educational technology is to improve student test score. الهدف الأساسي لتقنيات التعليم هو تحسين درجات الطلاب						
34	Students should learn to use technology in order to be prepared for tomorrow's jobs. ينبغي على الطلاب أن يتعلموا استعمال التقنية ليكونوا مهنيين للوظائف المستقبلية.						
35	I perceive technology as a teaching tool. أعتقد أن التكنولوجيا وسيلة من وسائل التدريس						
36	In the university we are teaching curricula that prepare our student for future jobs. في الجامعة نحن ندرس الطلاب المناهج التي تهيئهم للأعمال في المستقبل.						
37	I support the mandatory use of technology in teaching by universities. أؤيد أن تقوم الجامعة بفرض استخدام التقنية في التدريس						
38	The university and the faculty members should instruct students in detail on						

	<p>how to use technology in the classroom.</p> <p>على الجامعة وأعضاء هيئة التدريس أن يحددوا للطلاب بالتفصيل مسارات استخدام التقنية داخل الفصل الدراسي.</p>						
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### Section 3. Demographic information

39. What is your gender?

- Male  
 Female

40. What is your academic rank?

- Professor  
 Associate Professor  
 Assistant Professor  
 Lecturer  
 Teaching Assistant  
 Other (Please specify) \_\_\_\_\_

41. How many years of teaching experience do you have?

- 1- 5  
 6 - 10  
 11- 15  
 16 - 20  
 21 years or more

42. In Which school/ college you teaching?

Liberal Arts and Humanities

Dentistry

Engineering	Community College
Sciences	Pharmacy
Family Sciences	Applied Medical Science
Education	Economics and Administration/Business Administration
Law	Marine Sciences
Medical	Communication and Media
Medical Rehabilitation	Home Economics
Sciences	Meteorology, Environment and Arid Land Agriculture
Computing and Information Technology	Environmental Designs
Nursing	Others:

43. What is your nationality?

- Saudi
- Non-Saudi (Please specify) \_\_\_\_\_

44. From which country did you obtain your last degree?

- Saudi Arabia
- USA
- UK
- Canada
- Australia
- Egypt
- Jourdan
- Ireland
- Germen
- New Zealand
- France
- others

## Appendix B: IBR approval of initial study



Date: March 11, 2019

TO: Ahmed Fallatah, (ahmedfallatah@ku.edu)

FROM: Alyssa Haase, IRB Coordinator (785-864-7385, [irb@ku.edu](mailto:irb@ku.edu))

RE: **Approval of Initial Study**

The IRB reviewed the submission referenced below on 3/11/2019. The IRB approved the protocol, effective 3/11/2019.

IRB Action: <b>APPROVED</b>	Effective date: <b>3/11/2019</b>	Expiration Date : <b>3/10/2023</b>
<b>STUDY DETAILS</b>		
Investigator:	<a href="#">Ahmed Fallatah</a>	
IRB ID:	STUDY00143712	
Title of Study:	Investigating the Relationship between Faculty Perception of Educational Technology and the Level of Technology Integration into Teaching and Learning	
Funding ID:	None	
<b>REVIEW INFORMATION</b>		
Review Type:	Initial Study	
Review Date:	3/11/2019	
Documents Reviewed:	• Consent forms.docx, • KU HRP Human Research Protocol- Ahmed Fallatah.docx, • Recruitment materials.docx, • Study Survey.docx	
Exemption Determination:	• (2)(i) Tests, surveys, interviews, or observation (non-identifiable)	
Additional Information:		

**KEY PROCEDURES AND GUIDELINES.** Consult our website for additional information.

1. **Approved Consent Form:** You must use the final, watermarked version of the consent form, available under the “Documents” tab, “Final” column, in eCompliance. Participants must be given a copy of the form.
2. **Continuing Review and Study Closure:** Continuing Review is not required for this study. Please [close your study](#) at completion.
3. **Modifications:** Modifications to the study may affect Exempt status and must be submitted for review and approval before implementing changes. For more information on the types of modifications that require IRB review and approval, [visit our website](#).
4. **Add Study Team Member:** [Complete a study team modification](#) if you need to add investigators not named in original application. Note that new investigators must take [the online tutorial](#) prior to being approved to work on the project.
5. **Data Security:** [University data security and handling requirements](#) apply to your project.
6. **Submit a Report of New Information (RNI):** If a subject is injured in the course of the research procedure or there is a breach of participant information, an RNI must be submitted immediately. Potential non-compliance may also be reported through the RNI process.
7. **Consent Records:** When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.
8. **Study Records** must be kept a minimum of three years after the completion of the research. Funding agencies may have retention requirements that exceed three years.

## Appendix C: Sample information statement

### Sample Information Statement

The Department of The Educational Leadership and Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are conducting this study to better understand the relationship between technology integration into teaching and learning and faculty perception of educational technology. This will entail your completion of a survey. Your participation is expected to take approximately 10-15 minutes to complete. The content of the survey should cause no more discomfort than you would experience in your everyday life.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of technology integration into teaching and learning in Saudi universities. Your participation is solicited, although strictly voluntary. Your name will not be associated in any way with the research findings. Your identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission. It is possible, however with internet communication, that through intent or accident someone other than the intended recipient may see your response.

If you would like additional information concerning this study before or after it is completed, please feel free to contact us by phone or mail.

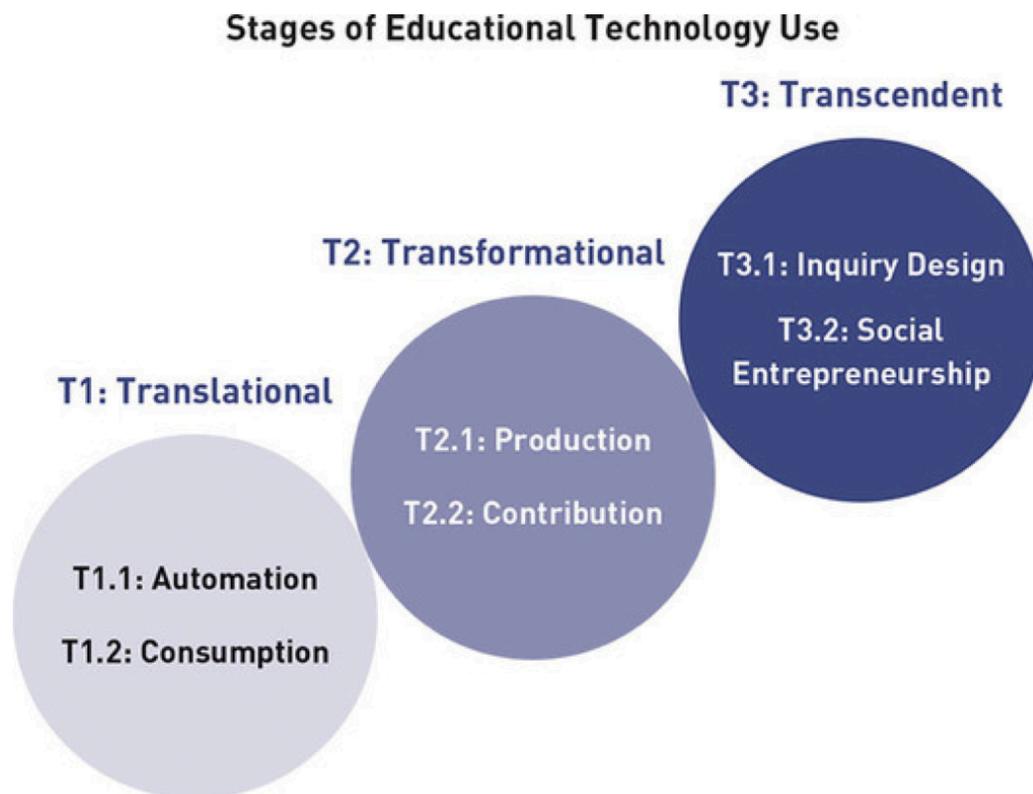
Completion of the survey indicates your willingness to take part in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Research Protection Program (HRPP), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email [irb@ku.edu](mailto:irb@ku.edu).

Sincerely,

Ahmed Fallatah  
Principal Investigator  
Educational Leadership and Policy Studies  
JR Pearson Hall  
University of Kansas  
Lawrence, KS 66045  
+1(785) 3936-409  
[ahmedfallatah@ku.edu](mailto:ahmedfallatah@ku.edu)

Yong Zhao, Ph.D.  
Foundation Distinguished Professor  
Faculty Supervisor  
Department of Curriculum and Teaching  
JR Pearson Hall  
University of Kansas  
Lawrence, KS 66045  
| [yongzhaoeducation@gmail.com](mailto:yongzhaoeducation@gmail.com)

## Appendix D: T3 Framework



Magana, Sonny. *Disruptive Classroom Technologies: A Framework for Innovation in Education* (Kindle Location 1268). SAGE Publications. Kindle Edition.

### Appendix E: Instrument key Elements

		Items
Key Elements 1	Technology integration- Translational Level	1 - 7
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