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Digital Information Needs for Understanding Cell Divisions in the Human Body

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KEYWORD

Digital information needs; user acceptance; technology acceptance model; leap motion

ABSTRACT

Information needs for understanding cell divisions in the human body is important in the learning process. Although sketches, images and blocks of 3D puzzles were used for teaching and learning, unfortunately those tools are static and incapable of being manipulated. Hence, digital information is the best tool for the teaching and learning of cell divisions in the human body via software applications. A cell motion is a digital information application developed using leap motion to demonstrate cell movement in the human body. However, the factors that influence students towards adopting this application are not obvious and often ignored. The method for evaluating the factors influencing its user's acceptance is the Technology Acceptance Model (TAM) via a questionnaire distributed among medical students to gain statistically valid quantitative results through hypothesis-testing. The result indicates that digital information needs for the understanding of cell divisions in the human →

body are influenced by the user's Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). However, the Attitude (AT) towards use did have a significant effect on PU and PEOU. Moreover, PEOU had a strong and significant influence on PU, while AT positively influenced users' behavioural intention (BI) of using digital information needs for the understanding of cell divisions in the human body.

1. Introduction

Technology has become available everywhere in education and is developing very quickly. Schools and universities have benefited greatly from this technology in improving and developing teaching methods. Universities and higher educational institutions are equipped with computer devices to support educational activities and this type of education will have a positive impact on student learning outcomes [1]. With the advances of modern technology, digital simulations and models help students facilitate basic knowledge acquisition and enhance perceptual variation [2]. In practice, this new technology has been applied in medical fields, and mobile devices with applications, video games, simulations, virtual reality and wearable devices like Google Glass [3]. These are some available techniques with which to keep up with the changing educational environment [4]. In virtual mode, human interactions are necessary to ensure that appropriate technologies are employed correctly to meet interaction needs with the available materials in the form of computer aided learning programs. One of the new interaction devices which have been applied in the medical education field is the Leap Motion controller which depends on virtual technology. The Leap Motion controller is a tiny hardware device that is connected to a computer, and allows users to manipulate digital objects and hand movements in space in an efficient and attractive way. The device contains two cameras and three infrared LEDs, with a scanner used to track hand movements. It does not have a special system, and depends on other systems made by developers. In addition, they have their own applications made by their developer team, available on the company's website [5]. One of the major advantages of using the leap motion controller in higher education is allowing users to manipulate and understand objects by grasping complex objects which are hard to understand, such as anatomy and blood collection.

An application known as Cell Motion is developed for the visualization of cells in the human body for medical field students, using the Leap Motion controller in the interactions. The cell motion application has been used by students in the medical faculty of the King Abdulaziz University. Furthermore, cell motion is an application that serves as the platform for educational information needed by students to understand the cells in the human body. However, students' acceptance of digital information applications in assisting their learning processes has not yet been investigated and is not clear. Thus, this paper aims to investigate the students' acceptance of using a digital information application to assist knowledge acquisition. In this paper, the Technology Acceptance Model (TAM) is used to explore the students' acceptance of a tool in digital information needs theory, using a case study conducted at the Faculty of Applied Medical Science, King Abdulaziz University. This study is significant when it comes to understanding the factors that affect students' acceptance of using a digital information application in order to stimulate their learning process.

This paper comprises five sections, organized as follows. The present section is the introduction to the study. Section 2 presents a background review and further explanation, Section 3 details the case

study method used for evaluating user acceptance. Section 4 presents the case study results. Lastly, Section 5 elaborates on the discussions and assumptions of the findings, with Section 6 concluding this study.

2. Background Review

The most important aspect of information needs is to recognize what is needed for the solving of problems [6, 7]. Previous studies have provided some evidence about the impact of technology in the learning process when it comes to improving students' learning by providing them with knowledge from many reliable sources and access to a wide range of information [8, 9]. The students can then interact with data and receive feedback, problem solve, manage information and produce more developed results using unique methods and tools such as text processors, databases and spreadsheets [10]. The introduction of technology in classes gives teachers the capability to diversify their methods of explanation, teaching and helping, to develop lessons effectively so students can obtain as much information as possible in a simple, clear way [11, 12]seventh and eighth grade. Students or learners are always searching for education opportunities, and education continues to develop constantly, with new educational learning tools emerging constantly. Google Glasses [3] is a very good example of an educational learning tool. This is a wearable tool in the form of glasses which is worn independently and can be put over traditional glasses. The frame consists of a battery, processor, microphone to capture sound and a camera to capture still images and video. Google Glasses are a great evolution in the learning environment and bring new possibilities as a tool that helps to search, take pictures, record video and translate [13]. It allows the teacher and student to connect online anytime interactively. Another example of an educational tool is Hologram. This is a laser light overlap that creates a three-dimensional image. It can be used in many areas of life such as education, marketing, advertising and any environment where people could benefit. This technology can be used in the education of all ages. It is used by virtual teachers, who can be followed anywhere, and they have the ability to see and speak to pupils as easily as if they were in the same room. Hologram can make a big difference in education, such as through bringing in famous characters from past centuries and making they speak as if they exist, and educate students as an assistant teacher [14].

The Leap Motion controller (LMC) [15] is one of the best educational tools. It enhances and improves learning systems persistently. LMC is a tiny hardware device that is connected to any computer system, and allows the user to manipulate objects by hand movement in an area with high performance and accuracy [16]. LMC is designed to build an interaction environment with computer devices in air spaces, and eliminate communication barriers between human and computer. It is not designed to dispense the mouse and keyboard, but it is intended to be used alongside these devices.

2.1. Theoretical Framework

The theory of information need lies with someone seeking information and attempting to start an information search. This is associated with the fact that the user needs to find an answer to a well-defined question [17]. Information science's best known model of information need "deems it to be a "black box"—unknowable and non-specifiable by the user" in a query to the information system [17]. The central part of the information need theory [17] is devoted to studying "*eight adjacent or surrogate concepts (information seeking, search and use; problem, problematic situation and task; sense making*

and evolutionary adaptation/information foraging". Based on these facts, the current research seeks to examine how eight surrogates could apply to the utilization of Leap Motion in improving learning systems, particularly, the use of users' acceptance of LMC in learning and teaching. Understanding that the adoption of such tools lies with the users' perception, TAM has been adopted. TAM constitutes an information system theory used for establishing the relationship between the causes and consequences of a system. The TAM model has been used as a tool in many assessments in relation to information systems and its results are statistically reliable and widely accepted by scientific community [18 - 21].

This study adopts TAM as an effective theory with which to explain user acceptance of an information system developed by [22]. TAM constitutes the most widely used information system acceptance model, and its theory is based on the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB). These two theories evaluate intention as a mediating factor in the relationship between individual attitudes and actions towards the adoption of a technology [6]. According to TAM, the usage of technology is determined by PU and PEOU. PU is defined as the degree to which a user believes that using information systems would enhance his or her daily routine responsibilities and PEOU is defined as the degree to which a person believes that using information systems would be free from complexity and effortless [22]. Two versions of TAM have been developed as an expansion of the original concept by [22]. According to [22], TAM (see Figure 1) assumes that the fundamental determinants of user acceptance of technology are PEOU and PU.

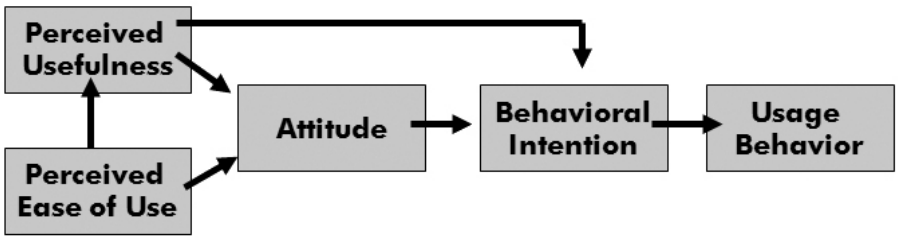

Figure 1. Technology Acceptance Model (Davis, 1989).

TAM also assumes that PU will be influenced by PEOU. Another determinant is users' attitude toward technology usage (AT) which is defined as an individual's positive or negative feeling about using a system. Both PEOU and PU influence AT. The last determinant is BI, which is the degree to which a person has formulated conscious plans to perform or not perform a specified future behavior. PU and AT are directly influence BI.

The results of several studies have demonstrated that TAM has significant prediction power in exploring the user acceptance of any information system. Most empirical studies have indicated that the basic constructs of TAM (PEOU and PU) constitute the most highly significant determinants of behavioral intention to accept an information system [23]. However, several researchers [24, 25] have recognized the need to introduce external variables in order to improve its explanatory power. Based on this, the present research utilized system characteristics that allow for an evaluation of the level of ease at which the proposed system is expected to be used. Users are more willing to adopt a new technology if it is easy to understand and operate. These two constructs influence the users' intention (UI) to use a given information system, that is "the measure of the strength of the user's intention to use information system" and their actual use of the system. Thus, based on this theory, this research

adopted the conceptual model suggested by [22] to investigate the user acceptance of the system of digital information needs to understand cell divisions in the human body.

2.2. Digital Information Need Tools

An information need is the desire or necessity by a person to acquire intellectual material to ease, resolve, or respond to a situation in their life [26]. On the other hand, digital information is the combination of data processes; data is stored using a series of ones (1s) and zeroes (0s). Physical data is converted from analogue to digital data using analogue-to-digital converters. This digital data is then processed to yield digital information [27]. Therefore, information needs based on digital information sources require software tools. Thus, the user‘s acceptance of these software tools is crucial. Among the crucial software tools used is digital information game-based learning (GBL). This is an effective way of offering fun and entertaining learning for children, while educating them in unconventional ways. The idea of this application is to connect humans and computers using a leap action device to help elementary students practice combining and subtracting between 1 and 100 by using balloons, the exercises are more interesting for children. The application has 10 different stages of difficulty, and students move through the virtual world by playing the game. They play by putting his/her hand on the jump movement of the device and moving it smoothly according to the stages in front of the calculation of the numbers in the balloons [28]. This game has been tested by third stage primary and the results of the game are as follows. The first group solved all problems in all stages successfully and there was good coordination between hand and eye when focusing to solve the issues, with no real difficulty encountered. The second group solved the problems successfully but found difficulty in coordinating the balloons. The third group was slow to solve the problems, but felt they enjoyed their playing time and wanted to repeat the experience. The last group did not solve the problems because they had a problem with their account and looking for balloons was not fun for them.

CadaVR [29] is a virtual reality environment of medical education that simulates a real cadaver lab. It was developed by Ahmed Aljadaan and Ryan James, who are PhD students in Biomedical and Health Informatics at the University of Washington, and Mark Laughery, who has a Master degree student in Human Centered Design and Engineering. The main objective of the system is to help medical students learn facts about the heart at the simplest level through its interactive interface [29]. CadaVR is built on the web and is available through the Leap Motion Developer Gallery. The system has been developed with Windows and Oculus Rift using JavaScript programming language. The system capabilities allow students to grab objects by their hands, scale objects bigger or smaller, and complete specific tasks. When a student has completed their task, CadaVR displays a detailed description of the title of the next task needed to perform, including images and video.

Tedcas [30] is a healthcare technology company at the forefront of the medical information revolution, relying on access to their system and handling medical information in sterile environments. This is enabled through a touch-free digital connection, and the idea of their system is to highlight on how surgeons work on new technologies that make human and computer interaction more natural and simple. This technology is now being studied in many hospitals and research centers around the world including facilities in Spain, Ireland, Argentina, Chile, Canada and the United States [30]. The Tedcas System consists of many features, as follows. Firstly, it assists surgeons to work more efficiently, and lowers the medical risks that patients are exposed to. Secondly, surgeons can interact with medical images with hand movements alone, in a sterile medical environment. Thirdly, X-rays and CT scans are

seen on a screen above the patient, managed with a mouse and keyboard for quick navigation. Lastly, users can interact with the computer with hand movement, with a precision up to 1/100th. The software works on any computer running Mac OS X 10.7 or 10.8, or Windows 7 or 8.

There is another application which allows medical students and health professionals related to medicine to oversee and control human skeleton bones via gestures, using the Leap Motion controller. This controller uses hand gesture recognition previously defined for accurate control of the human skeleton's bones. The software system was created with the Unity 5.3 editor, while the scripts necessary for the application to work use C# [31]. The application was tested to ensure that its various elements were easy to use and control. This application provides users with control of the human skeleton image, allows them to zoom in or out, control the entire skeleton itself, and be presented with information about each bone or set of bones, via three-dimensional image formation of the human skeleton.

IT has been shown that digital information needs tools are developed for many target groups, such as for children, medical students and health professionals. On the other hand, the literature has shown that the main objective of these digital information needs tools is to use the software tool to acquire intellectual material to ease, resolve, or respond to a situation in their life [7, 17, 26].

3. Methodology

3.1. Case Study Research Design

The case study method has been selected for use in the current study's investigation of digital information application use acceptance, in the context of knowledge acquisition. Since the formation and identification of TAM as the theoretical basis behind the current study, a case study at the Department of Medical Laboratory Technology, Faculty of Applied Medical Science, King Abdulaziz University was undertaken. The case study was completed in the Histology and Cytology course, with the specific aim being to demonstrate cell division and movement within the human body. The reason for this choice was that case study research has steadily become widely accepted as an effective approach when researching and attempting to comprehend complicated problems under real world conditions [32 - 35]. The case study was designed based on 5 key aspects [32, 36].

3.1.1. Research Question

This study addresses the following research question:

What is the student acceptance of Perceived ease of use (PEOU), Perceived Usefulness (PU), Attitude (AT) and Behavioural Intention (BI) regarding the use of a Leap Motion when demonstrating cell division in the human body, through virtual reality?

3.1.2. Propositions or Hypothesis

A hypothesis is an educated guess that steers research in the right direction and is constructed to support the research question [36]. The hypotheses of the current case study are defined in Table 1:

Table 1. The hypotheses

Hypothesis	Description
H_1	Perceived ease of use (PEOU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality
H_2	Perceived Usefulness (PU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality
H_3	Perceived Usefulness (PU) will positively influence users' behavioural intention to use of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality
H_4	Attitude towards (AT) will positively influence users' behavioural intention to use of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality
H_5	Perceived Ease of Use (PEOU) will positively influence Perceived Usefulness (PU) of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

3.1.3. Unit of Analysis

The cell motion as an digital information application using Leap Motion has been introduced to the Histology and Cytology course during the fall semester of 2019, to demonstrate cell division and movement inside the human body. This course is offered to students from the Faculty of Applied Medical Science and there were 25 students enrolled for that semester. Students used the cell motion application during their knowledge acquisition. After that, a set of questionnaires was distributed among them with the intention of collecting their acceptance, based on TAM, regarding the cell motion application. Thus, the factors that will influence the students' acceptance based on TAM are identified as:

- Perceived Ease of Use (PEOU)
- Perceived Usefulness (PU)
- Attitude (AT)
- Behavioral Intention (BI)

3.1.4. Determination of how data is linked to prepositions

Data collected during the case study should be a reflection of the proposition and mapped to it [36]. As TAM is being used to investigate the users' acceptance, the variables are identified based on the model. Table 2 shows the variables used in this research, which reflects the current study's proposition and research questions.

Table 2. Independent & Dependent Variables

Predictor (Independent Variables)	**Dependent**
H_1:Perceived Ease of Use (PEOU)	Attitude(AT)
H_2: Perceived Usefulness (PU)	Attitude(AT)
H_3: Perceived Usefulness (PU)	Behavioral Intention (BI)
H_4: Attitude (AT)	Behavioral Intention (BI)
H_5: Perceived Ease of Use (PEOU)	Perceived Usefulness (PU)

3.1.5. Criteria to Interpret Finding

All results and conclusions are made under the context of the data gathered through the questionnaire in the case study phase, while taking into account the research questions and propositions together with the statistical analysis achieved via SPSS.

3.2. Criteria for Judging Quality of Research Design

There were four tests used, as described in [36], intending to establish the quality of the case study. These are described below.

3.2.1. Construct Validity

Construct validity is related to accurate operational measures being selected for the specific concepts under investigation. A total of four factors, based on TAM, were examined, with describing the variables estimated in the current paper, to provide data for the research questions and proposition.

3.2.2. Internal Validity

Internal validity cannot be used for case studies, as there is no relation with a causal situation. For the current study, every inference is considered on an individual basis, at the research design stage.

3.2.3. External Validity

For case studies, external validity is where the findings can be applied to other, similar cases as well. The current study's results can be generalized to other situations, as the amount of students involved is 125.

3.2.4. Reliability

Reliability is where certain common procedures were used in another case study, then the same results would be recorded, by the same researcher or another party. This study completed its reliability test with statistical analysis software.

3.3. Implementing and Monitoring the Case Study

This case study involves the introduction of a cell motion application to students studying in the Histology and Cytology course. Thus, it is important to monitor the project progress and compare results with the original plan. In addition, one of the authors was teaching this course and was fully responsible for demonstrating cell motion to the students and how to use the application properly. Although the application was introduced and the students were duly trained, the author continued monitoring the students when they used it. The user interfaces are shown in Figure 2, where Figure 2 (a) shows the main page of the application, Figure 2 (b) presents the cell content interfaces and Figure 2(b) is the user guide interface.

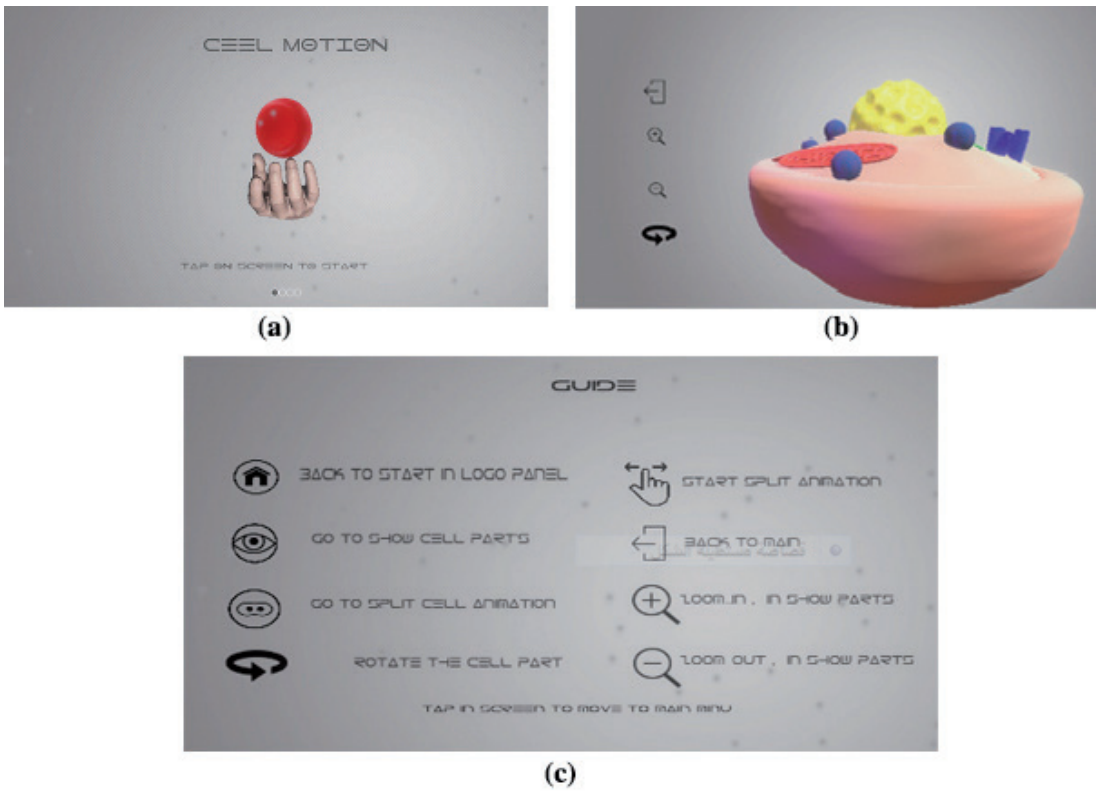

Figure 2. The user interface of cell motion as (a) The main page of the application; (b) Cell contents interface; (c) User guide interface.

At the end of the semester, a set of questionnaires was distributed among the students to collect their acceptance of this application. The data collected during the project development is summarized in Table 3 below.

Table 3. The questionnaire results (frequency distribution)

TAM factors	Items	Completely disagree	Moderately disagree	Somewhat disagree	neutral (neither disagree nor agree)	somewhat agree	moderately agree	Completely agree
		1	**2**	**3**	**4**	**5**	**6**	**7**
Perceived Ease of Use (PEOU)	PEOU 1: My interaction with the App is clear and understandable	35	10	15	15	20	15	15
	PEOU 2: Interacting with the App does not require a lot of mental effort	30	15	15	20	5	10	30
	PEOU 3: I find the App to be easy to use	35	10	10	15	10	15	30
	PEOU 4: I find it easy to get the App to do what I want it to do	30	10	30	5	10	20	20
Perceived Usefulness (PU)	PU 1: Using the App improves my performance as a student	20	5	25	20	20	10	20
	PU 2: Using the App when studying increases my productivity	45	10	15	15	15	25	0
	PU 3: Using the App enhances my study effectiveness	35	20	5	15	15	20	15
	PU 4: I find the App to be useful in my study	50	10	20	5	25	15	0
Attitude toward using (AT)	AT 1: I think it is worthwhile to use the App	5	10	40	25	25	5	15
	AT 2: I like using the App	20	20	25	20	20	20	0
	AT 3: In my opinion it is very desirable to use the App for academic and related purposes	25	35	30	20	15	0	0
	AT 4: I have a generally favourable attitude toward using the App	10	30	40	20	10	15	0
Behavioral Intention to use (BI)	BI 1: I intend to use the functions and content of the App to assist my academic activities	40	15	5	20	25	5	15
	BI 2: I intend to use the functions and content of the App as often as possible	40	10	10	15	20	20	0
	BI 3: I intend to use the functions and content of the App in the future	40	5	5	15	10	30	30

4. Result

This section describes the results of the questionnaire and the statistical analysis using reliability analysis, correlation analysis and multiple regressions in order to reveal the factors behind the students' acceptance. This is translated into the hypotheses relating to using the digital information application in their learning process.

4.1. Demographic Profile

There were 125 students which are 5 male and 120 female that participated in tested the application and answered the questionnaire. The respondents were aged from 19 to 23 years old and all of them were sophomores.

4.2. Reliability Analysis

The reliability analysis was conducted to check if the internal item validity and consistency were present in each factor, achieved through the SPSS analysis tool. The reliability analysis result is shown in Table 4.

Table 4. Cronbach's alpha of items

Factor	Items	Cronbach's alpha
Perceived Usefulness (PU)	4	0.971
Perceived Ease of Use (PEOU)	4	0.950
Attitude (AT)	4	0.913
Behavioural Intention (BI)	3	0.928

4.3. Correlation Analysis

Table 5 shows that result of the correlation analysis that was performed to investigate the connections between PEOU, PU, AT, and BI. The result revealed that inter-correlations among PEOU, PU, AT, and BI are as follows:

- PEOU correlated positively with PU, AT, and BI
- PU correlated positively with PEOU, AT, and BI
- BI correlated positively with PEOU, AT, and PU
- AT correlated positively with PEOU, PU, and BI

Table 5. Inter-correlations among factors (adults)

Correlations					
		PEOU	PU	AT	BI
PEOU	Pearson Correlation	1	.910**	.818**	.840**
	Sig. (2-tailed)		.000	.000	.000
	N	125	125	125	125
PU	Pearson Correlation	.910**	1	.828**	.814**
	Sig. (2-tailed)	.000		.000	.000
	N	125	125	125	125
AT	Pearson Correlation	.818**	.828**	1	.849**
	Sig. (2-tailed)	.000	.000		.000
	N	125	125	125	125
BI	Pearson Correlation	.840**	.814**	.849**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	125	125	125	125

**. Correlation is significant at the 0.01 level (2-tailed).

4.4. Multiple Regression

This section explores the result of independent & dependent variables as shown in Table 5. As for examining the impact Independent Variables have on Dependent Variables, multiple regressions were conducted. The results are demonstrated in Table 6, showing that it there is a significant link between BI "Dependent Variable" and AT as independent variables. This is seen where F=192.672 and P-value<0.01 with the coefficient of determination at 55.6 %, also it there is a significant link between BI "Dependent Variable" and PU as independent variables. This is seen where F=192.672 and P-value<0.01 with the coefficient of determination at 35.3 %.

There was another significant model between PU "Dependent Variable" and PEOU as independent variables where F=595. 996 and P-value < 0.01 with the coefficient of determination at 91 %,

also significant model was seen between AT "dependent Variable" PU as independent variables where F=149. 249 and P-value < 0.01 with the coefficient of determination at 48.5 %, also there was significant model between AT "Dependent Variable" and PEOU as independent variables was noted.

Table 6. The Multiple regression between Dependent Variables and Independent Variables in the study group

	Unstandardized Coefficients		**Standardized Coefficients**	**T**	**Sig.**	**ANOVA**		**R^2**
	B	**Std. Error**	**Beta**			**F**	**P-value**	
(Constant)	1.536	.269		5.709	.000			
Perceived Ease of Use (PEOU)	.233	.073	.377	3.198	.002			
Perceived Usefulness (PU)	.405	. 099	.485	4.111	.000	149.249	<0.01	.705
a. Dependent Variable: Attitude(AT)								
(Constant)	-2.291	.325		-7.052	.000			
Perceived Usefulness (PU)	.464	.104	.353	4.462	.000			
Attitude (AT)	.875	.125	.556	7.025	.000	192.672	<0.01	.756
b. Dependent Variable: Behavioral Intention (BI)								
(Constant)	2.395	.118		20.268	.000			
Perceived Ease of Use (PEOU)	.672	.028	.910	24.413	.000	595.996	<0.01	.828
c. Dependent Variable: Perceived Usefulness (PU)								

4.5. Hypothesis Testing

The hypothesis testing results indicated positive results, as shown in Table 7.

Table 7. Summary of hypothesis testing

Hypothesis	Specification	Results
H_1	Perceived ease of use (PEOU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality	Supported ((β =.377, $p < 0.01$)
H_2	Perceived Usefulness (PU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality	Supported ((β =.485, $p <0.01$)
H_3	Perceived Usefulness (PU) will positively influence users' behavioural intention to use of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality	Supported ((β =.353, $p <0.01$)
H_4	Attitude towards (AT) will positively influence users' behavioural intention to use of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality	Supported ((β =.556, $p <0.01$)
H_5	Perceived Ease of Use (PEOU) will positively influence Perceived Usefulness (PU) of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality	Supported ((β =.910, $p <0.01$)

5. Discussion

It can be seen that the results for PEOU, PU, AT and BI in this study offer support for the TAM, and are in line with previous information systems (IS) literature results. Namely, that PEOU is a strong determinant [37] denoting that Leap Motion could possibly act as a helpful digital information application for education contexts. Hypotheses 1, 2, 3, 4 and 5 were based on TAM literature, clearly putting forward perceptions regarding Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality. All hypotheses are discussed below.

5.1. H_1: Perceived ease of use (PEOU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

This hypothesis is tested and seen as supported, with ((β =.377, p <0.01). This suggested that students would like to use Leap motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality and PEOU influence them in using it.

5.2. H_2: Perceived Usefulness (PU) will positively influence users' attitude towards Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

The second hypothesis is tested and the result is supported with ((β = 485, p<0.01). This indicates that students would like to use Leap motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality and Perceived Usefulness (PU) influences them in using it.

5.3. H_3: Perceived Usefulness (PU) will positively influence users' behavioural intention to use Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

The third hypothesis is tested and seen as supported, with ((β =..353, p <0.001), which reveals that students would like to use Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality and Perceived Usefulness (PU) influence them in using it.

5.4. H_4: Attitude towards (AT) will positively influence users' behavioural intention to use Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

The fourth hypothesis shows that it is supported ((β =.556, p <0.01) meaning that students would like to use Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality and Attitude towards (AT)influencing them in using it.

5.5. H_5: Perceived Ease of Use (PEOU) will positively influence Perceived Usefulness (PU) of Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality

The fifth hypothesis is supported with ((β =.910, p <0.01), which indicates that students would like to use Leap Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality and Perceived Ease of Use (PEOU) influences them in using it.

5.6. Research Question

The main research question aims to gather student acceptance of Perceived ease of use (PEOU), Perceived Usefulness (PU), Attitude (AT) and Behavioural Intention (BI) when it comes to using Leap

Motion in the Demonstration of Cell Division in the Human Body Using Virtual Reality. In answering this as shown table 5, it can be concluded that:

- PEOU is correlated positively with PU, AT, and BI
- PU is correlated positively with PEOU, AT, and BI
- BI is correlated positively with PEOU, AT, and PU
- AT is correlated positively with PEOU, PU, and BI

6. Conclusions

As it is understood, information needs based on digital information sources requires software or applications to visualize the knowledge during any learning process. Cell motion shown in an application which uses leap motion is an example of a digital information application, developed to visualize cell movement in the human body. This paper attempts to ascertain students‘ acceptance rate, and to find ways to encourage them to use a cell motion digital information application, via TAM. Four factors were investigated for this investigation, which were PEOU, PU, AT, and BI. The result indicated that PEOU is correlated positively with PU, AT, and BI; PU is correlated positively with PEOU, AT, and BI; BI is correlated positively with PEOU, AT, and PU; and AT is correlated positively with PEOU, PU, and BI.

The results of this study have shown a positive correlation between the factors examined, and therefore it can be concluded that the hypotheses defined in Table 1 are true, confirming that digital information needs for the understanding of cell division in the human body are influence by the user's Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). However, the Attitude (AT) have a significant effect on PU and PEOU. Moreover, PEOU had a strong, significant influence on PU and AT positively influenced users' behavioural intention (BI) regarding digital information needs when it comes to understanding cell divisions in the human body. The results of this study are significant and contribute to the digital information research area, as well as specifically towards understanding user acceptance rates when it comes to using a digital information application.

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