Determinants of behavioral intention to use e-textbooks: A study in Iran's agricultural sector

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ABSTRACT

With the advent of internet and information systems, the trend on the use of mobile learning (M-learning) in education has a rapid growth. So, the people who live in the media-saturated world have great attention to these new technologies. Therefore, the interaction between human and these technologies is important and considerable. This interaction depends on psychological factors and technology attributes. In this regard, this paper investigates the determinants of users' behavioral intention to use electronic textbooks (e-textbooks) in the agricultural sector in Iran. A joint project between Iran and Japan has been accomplished during a two years period. In the final stage, six workshops were held in a less developed province of Iran. In these workshops, data were collected by questionnaires distributed among the pioneer farmers. Participants were aged 29–52, with a mean of 40. The mean of use of digital devices among participants was 2.17 from 3 and smartphone had the highest use among participants. Among the other variables studied, computer anxiety with the lowest mean and attitude towards the content quality of e-textbooks for agricultural education with the highest mean appeared. Multiple regression methods by SPSS and PLS-SEM along with the correlation coefficient were performed to examine the determinants that promote behavioral intention. The results showed that the perceived ease of use towards e-textbooks, attitude towards the content quality of e-textbooks, and attitude towards using e-textbooks were significantly related to behavioral intention to use e-textbooks. Attitude towards the content quality of e-textbooks appeared to be the strongest factor in making e-textbooks. It is suggested that e-textbooks come with blended learning approaches for the instruction of agricultural content.

1. Introduction

Nowadays, technologies are the driving forces behind most of the development and innovative activities around the world, especially in developing countries. The evolution of information and communication technologies (ICTs) has resulted in a paradigm shift in educational systems (Chinien, 2003). These technologies now permeate into education environments and underpin the very success of today's educational systems. ICT also provides numerous merits to the process of learning (UNESCO, 2002). ICTs change the way people learn by offering new alternatives to traditional classrooms. It is clear that ICTs can play a major role in providing informal learning to learners (Chinien, 2003). Haddad and Draxler (2002) state that "lifelong learning and training for the workplace cannot be confined to the traditional classroom. It is unrealistic and unaffordable to continue to ask learners to come to a designated place every time they have to engage in learning". ICTs allow the delivery of education in such a way to adapt to individual needs. Education is not confined to the limited space of a classroom, but to wherever and whenever the learner seems appropriate. ICTs have the capability of providing personalized, just-in-time, up-to-date, and user-centered education (Haddad and Draxler, 2002). One of the forms of integration of technology in education is electronic learning (e-learning).

E-learning has varied definitions in the literature. But one of the tersest definitions is presented by Desai (2010) as "Learning through new ICTs". Smartphones, tablets, and other mobile technologies are the basic tools of e-learning. Applying mobile technologies in learning and education can also be called as mobile learning (M-learning) approach.

Geddes (2004) defines M-learning as the "acquisition of knowledge and skills through mobile technology anywhere and anytime". Learners equipped with personal devices such as smartphones and tablets can gain learning experiences at home or outdoors (Sharples and Spikol, 2017).

Applications of e-learning provide invaluable ways for myriads of people to access various information regarding markets, finance, and governance systems that were previously unavailable for them (Qiang,
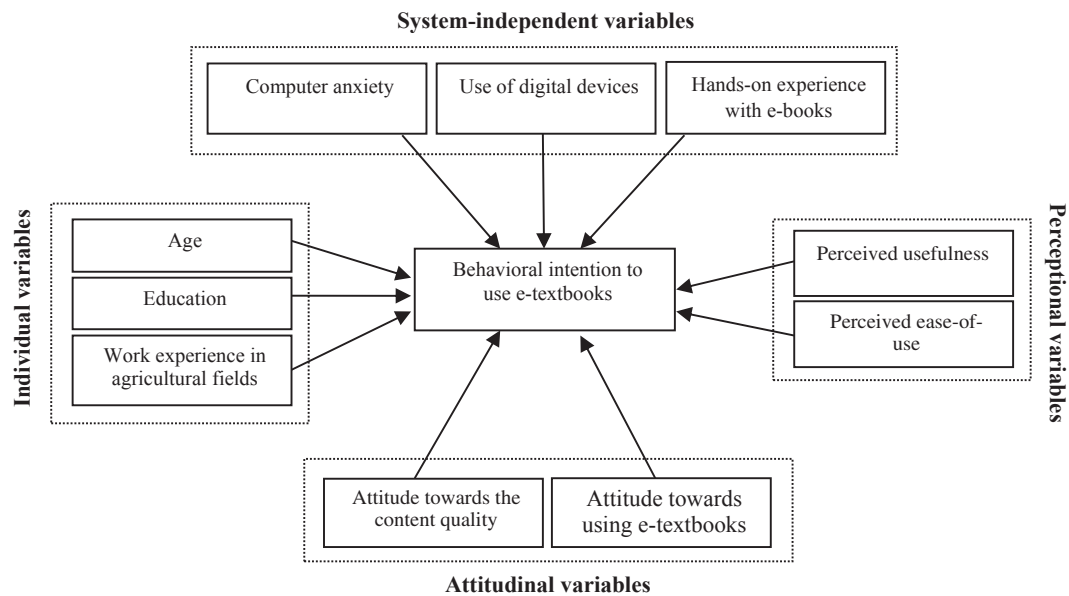
System-independent variables

Fig. 1. Variables and their relations in our research model.

Table 1
Details of educational workshops.

Date	Workshop titles	Time
18 April 2017	Development of rapeseed cultivation	9:00–14:00
18 April 2017	Productivity in the development of rainfed Chickpea	9:00–14:00
19 April 2017	Hydroponic production of greenhouse Lettuce	9:00–14:00
19 April 2017	Liquorice cultivation and processing	9:00–15:00
19 April 2017	Selecting the type and structure of greenhouses [1]	14:00–18:00
18 & 19 April 2017	Management of water efficiency in agriculture	14:00–18:00

[1] This course was added to the schedule as the request of the participants and has no related CHiLO book to it.

2011). It should be noted that selecting these ways and tools depends on different factors such as learners attributes, type of content, and technology attributes (Asghari and Fatemi, 2016).

Farmers as human capitals in the field of agriculture must be able to process large volumes of information in a short time because the environment is constantly changing and they should have the power of adaptability to the environment in order to improve their business performance. Helping farmers for innovative agriculture with access to up-to-date information has an important contribution to food security (Banks, 2012).

With respect to the vast range of agricultural beneficiaries, an information system is essential to transfer knowledge so that they could access to this information anytime and anywhere. Obviously, it can be achieved best in a virtual environment using information and

communication technologies (Attewell, 2005). E-learning plays an important role in the development of farmers' timely access to agricultural extension services and advices to meet their needs so that they leverage their products and livelihoods using this information.

Also, the development of mobile systems in recent years and the increase of mobile phone penetration rate, especially in rural areas in developing countries such as Iran, have been caused tendencies toward the use of mobile devices as one of the tools for education and training (Omidi Najaf Abadi and Anshieh, 2009). Mobile devices can also be an appropriate alternative for personal computers (PCs) because farmers can always easily carry them to the field.

In addition to the capabilities and capacities of mobile phones in education, the acceptance of these capacities by the users is also of great importance. The current research has been conducted to analyze the important determinants of behavioral intention to use e-textbooks.

The reason behind this inquiry is related to a joint project between Japan and Iran entitled "Comprehensive educational program for Iranian workforce through development of e-Learning contents" with the main goals of transferring knowledge and expertise of Japanese experts along with their success stories, developing high quality e-contents and preparing an e-learning platform for rapid development of e-content. This project was started in 2015 between the Japan International Cooperation Agency (JICA) and Academic Center for Education, Culture, and Research (ACECR) from Iran. Based on a mutual agreement, Kermanshah province was selected for deployment of the pilot plan of this project and five agricultural e-content were selected for the pilot phase. For the e-learning context, the CHiLO (Creative Higher Education with Learning Object) platform was introduced by the NPO CCC-TIES of Japan. CHiLO is an open source, java based and platform independent software which can be used in PCs and

Table 2
Cronbach's alpha coefficient for the variables.

Variables	No.items	Cronbach's alpha
Use of digital devices	3	0.70
Computer anxiety	4	0.78
Perceived usefulness towards e-textbooks for agricultural education	4	0.89
Perceived ease of use towards e-textbooks for agricultural education	4	0.82
Attitude towards the content quality of e-textbooks for agricultural education	7	0.84
Attitude towards using e-textbooks for agricultural education	8	0.81
Behavioral intention to use e-textbooks for agricultural education	3	0.91

Table 3
Descriptive statistics for the variables.

Variables	Score range	Mean	Median	Std. dev.	Min	Max
Age	–	40	40	7.50	29	52
Work experience in agricultural field	–	15.4	15	7.27	1	35
Use of digital devices	0–3	2.17	2	0.638	0.67	3
Computer anxiety	1–5	2.18	2	0.828	1	4.25
Perceived usefulness towards e-textbooks for agricultural education	1–5	4.3	4.5	0.724	1.5	5
Perceived ease of use towards e-textbooks for agricultural education	1–5	4	4	0.681	2.25	5
Attitude towards the content quality of e-textbooks for agricultural education	1–5	4.45	4.43	0.417	3.43	5
Attitude towards using e-textbooks for agricultural education	1–5	4.1	4	0.507	3.38	5
Behavioral intention to use e-textbooks for agricultural education	1–5	4.3	4	0.545	2.67	5

Table 4
Descriptive statistics for items of variables.

Variables	M	SD	CV	Rank
Use of digital devices				
Smartphone	2.46	0.61	0.248	1
PC	2.46	0.70	0.285	2
Tablet	1.57	1.12	0.713	3
Computer anxiety				
Computers make me feel uncomfortable	2.05	0.87	0.424	1
I'm worried when I want to take part in courses that deal with computers	1.94	0.87	0.448	2
Working with a computer makes me nervous	2.17	1.10	0.507	3
Computers scare me	2.54	1.34	0.528	4
Perceived usefulness towards e-textbooks for agricultural education				
I found that the e-textbook is useful in my agricultural activities	4.40	0.69	0.157	1
Using the e-textbook help me to access rapidly to agricultural information	4.34	0.72	0.166	2
Using the e-textbook facilitates my agricultural activities	4.56	0.92	0.202	3
Using the e-textbook improves my performance in agricultural activities	4.20	0.96	0.229	4
Perceived ease of use towards e-textbooks for agricultural education				
My interaction with the e-textbook is clear and understandable	4.14	0.55	0.133	1
It is easy for me to become skillful at using e-textbook	4.20	0.80	0.190	2
I find it easy to get the e-textbook to do what I want it to do	4.20	0.87	0.207	3
Interacting with the e-textbook does not require a lot of my mental effort	3.46	1.07	0.309	4
Attitude towards the content quality of e-textbooks for agricultural education				
eContent of e-textbook should be up to date	4.60	0.50	0.109	1
Videos and images into content should have educational effects	4.51	0.55	0.122	2
Content of e-textbook should be understandable for me	4.40	0.55	0.125	3
Content of e-textbook should be applicable for me	4.48	0.56	0.125	3
Content of e-textbook should consider the details of subjects	4.38	0.55	0.126	4
Content of e-textbook should be interesting for me	4.40	0.60	0.136	5
Content of e-textbook should be regular	4.34	0.72	0.166	6
Attitude towards using e-textbooks for agricultural education				
In my opinion, it would be very desirable to use e-textbook	4.34	0.48	0.111	1
I think e-textbook provide an opportunity that I use it anywhere	4.37	0.49	0.112	2
I hold a positive evaluation of e-textbook	4.29	0.52	0.121	3
I would like to use e-textbook	4.30	0.53	0.123	4
In my opinion, learning by e-textbook would be entertaining	4.09	0.53	0.130	5
I think e-textbook provide an opportunity that I use it at anytime	4.31	0.63	0.146	6
I prefer e-textbook to face to face education for learning	3.66	1.19	0.325	7
I think learning by e-textbook would be more than face to face education	3.37	1.19	0.353	8
Behavioral intention to use e-textbooks for agricultural education				
If I access the e-textbook, I predict that I would use it.	4.37	0.55	0.126	1
I plan to use the e-textbook in the next < n > months	4.37	0.55	0.126	1
Assuming I had access to the e-textbook, I intend to use it.	4.29	0.67	0.156	2

smart devices. This platform employs EPUB 3.0 standard's potentials to create robust and highly interactive e-textbooks. In these books, texts, images and several short videos (micro-lectures) are incorporated, in a way that the learners could study the course in their free times. These books can also be connected to the Moodle LMS platform and various Social Network Services (SNS) (Masumi et al., 2013).

Since identifying the factors influencing the acceptance of any new technology is the first step for its dissemination, it is important to analyze determinants of behavioral intention to use e-textbooks among target communities. With this aim, the research questions could be stated as follows:

- What are the relationships among the variables of the research model?
- Which factors can predict users' behavioral intention to use e-textbooks?

2. Literature review

Some psychological theories provide behavior prediction and its determinants including the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980) and technology acceptance model (TAM) (Davis, 1989, 1993). In all of the mentioned models, behavioral intention is a

Table 5
Correlation Matrix of the variables.

Variables	AG	WEA	UDD	CA	PUE	PEUE	ACQE	AUE	BIUE
AG	–	0.665**	−0.129	0.036	−0.327	−0.462**	−0.011	−0.102	0.000
WEA		–	−0.088	−0.008	-0.311	−0.398*	0.205	0.134	0.228
UDD			–	−0.041	0.139	0.269	0.184	0.208	0.061
CA				–	0.089	0.114	0.317	0.196	0.164
PUE					–	0.716**	0.380*	0.255	0.315
PEUE						–	0.515**	0.389*	0.509**
ACQE							–	0.550**	0.708**
AUE								–	0.631**
BIUE									–

Note: AG = age; WEA = work experience in agricultural field; UDD = use of digital devices; CA = computer anxiety; PUE = Perceived usefulness towards e-textbooks for agricultural education; PEUE = Perceived ease of use towards e-textbooks for agricultural education; ACQE = Attitude towards the content quality of e-textbooks for agricultural education; AUE = Attitude towards using e-textbooks for agricultural education; BIUE = Behavioral intention to use e-textbooks for agricultural education.

** $p < .01$.
* $p < .05$.

function of the behavior (use/acceptance).

TAM is a powerful and robust behavioral model that describes the factors of the use of new IT technologies by users (Hong et al., 2002; Legris et al., 2003; Surendran, 2012; Tome et al., 2014; Erasmus et al., 2015). This model has two main determinants to individuals' behavioral intention to use IT technology, perceived usefulness, and perceived ease of use, and external variables that influence on main determinants (Davis, 1989, 1993; Venkatesh and Bala, 2008). Initial TAM delineates the causal relationships from the perceived ease of use to the perceived usefulness, from the attitude to the behavioral intention, from the perceived ease of use and perceived usefulness to attitude, from external variables to perceived ease of use and the perceived usefulness, and from perceived usefulness to behavioral intention (Davis et al., 1989). This model has been validated by some studies in different fields, including internet banking (Marakarkandy et al., 2017; Lee, 2009), electronic commerce (Fayad and Paper, 2015), and recently mobile learning technology (Sánchez-Prieto et al., 2017; Chung et al., 2015; Shroff et al., 2011).

Some studies revealed the relationship between perceived usefulness and attitude towards using and as well as between perceived ease of use and attitude towards using new technology (Gumussoy et al., 2007; Legris et al., 2003; Moon and Kim, 2001; Gefen and Straub, 2000). According to Erasmus et al. (2015), perceived ease of use has a direct effect on the perceived usefulness. So, the attitude towards using and behavioral intention were determined by perceived usefulness. Results of Chung et al. (2015) showed that the participants' behavioral intentions to use mobile English vocabulary learning resources had a positive correlation with perceived ease of use and perceived usefulness. Furthermore, there is a positive correlation between perceived ease of use and perceived usefulness.

The results of the research investigated by Shroff et al. (2011) indicated that students' perceived ease of use had a significant influence on attitude towards the use of e-portfolios. Subsequently, perceived ease of use had the strongest significant influence on perceived usefulness. The research further demonstrated that individual characteristics and technological factors may have a significant influence on the adoption of e-portfolios.

Lee (2010) combined the expectation-confirmation model, the technology acceptance model and the theory of planned behavior (TPB) to predict the users' intentions to continue using e-learning. The results indicated that users' intention followed by satisfaction, perceived usefulness, attitude, concentration, and subjective norms.

The results of the work done by Wu and Chen (2017) showed that the perceived usefulness and attitude are critical to the continuance intention to use Massive Open Online Courses (MOOCs). Perceived ease of use has an important role in predicting continuance intention. Individual-technology fit affects the perceived ease of use, and perceived

ease of use has no significant effect on attitude.

Khanh and Gim (2014) argued that content quality is positively related to the perceived usefulness and perceived ease of use of M-learning and in this way, it has an indirect effect on intention. Connetha (2007) revealed the lack of appropriate content for M-learning influences the use of it. According to Shih and Fang (2004), perceived information quality as a component of service quality influenced the perceived usefulness, perceived ease of use, attitude towards mobile banking services, and acceptance.

The role of experience in the initial adoption of IT technology is important (Venkatesh and Bala, 2008; Venkatesh et al., 2003). Venkatesh and Bala (2008) found that increasing the experience will reduce the effect of perceived ease of use on behavioral intention and will increase the effect of perceived ease of use on perceived usefulness. So, they indicated that the perceived ease of use is an important determinant even if users have hands-on experience with the technology.

A significant body of previous research has highlighted the importance of computer anxiety by demonstrating its influence on perceived ease of use (Venkatesh and Bala, 2008) and on the intention (Elasmar and Carter, 1996).

3. Research model

Synthesizing prior research on TAM and research studied, we developed a research model. The following variables are used in our research model.

- Individual variables

In this research, individual variables are age (Venkatesh and Bala, 2008; Jain and Hundal, 2007; Woodburn et al., 1994), education level (Carrer et al., 2017; Kalba, 2008; Alvarez and Nuthall, 2006; DiMaggio and Cohen, 2003; Woodburn et al., 1994), and work experience in agricultural field (Carrer et al., 2017) that can influence individuals' behavioral intention to use technology and technology acceptance.

- System-independent variables
- Amount of use of digital devices: this variable is defined as an individual's use of a personal computer, tablet, and smartphone.
- Computer Anxiety: this variable is defined as an individual's apprehension, or even fear when she/he is faced with the possibility of using computer devices (Venkatesh and Bala, 2008; Venkatesh, 2000).
- Hands-on experience with e-books: this variable refers to an individual's previous experience in applying different e-books in smartphone, PC, or tablet.
- Perceptual variables

Table 6
Comparing means between groups in terms of the variables.

Variables	Means of groups		Mann-Whitney U	Means of groups		Mann-Whitney U
	Undergraduate and lower	Graduate and higher		Hands-on experience with e-books	No hands-on experience with e-books	
Use of digital devices	11.64	22.24	236**	20.84	13.38	197.5*
Computer Anxiety	19.32	17.12	128.5	16.53	17.44	128.5
Perceived usefulness towards e-textbooks for agricultural education	16.75	18.83	164.5	20.97	13.26	199.5*
Perceived ease of use towards e-textbooks for agricultural education	15.11	19.93	187.5	20.84	13.38	197.5*
Attitude towards the content quality of e-textbooks for agricultural education	16.5	19	168	17.84	16.21	149.5
Attitude towards using e-textbooks for agricultural education	16.79	18.81	164	18.78	15.32	164.5
Behavioral intention to use e-textbooks for agricultural education	17.25	18.5	157.5	18.69	15.41	163

** $p < .01$.
* $p < .05$.

- Perceived usefulness: this variable is defined as an individual's perception that using new technology will enhance or improve her/his performance (Davis, 1989, 1993). The operational definition of it in this research context is the degree to which a person believes that using e-textbook for agricultural education would improve agriculture activities.
- Perceived ease of use: it is defined as an individual's perception that using new technology would be free from effort (Davis, 1989, 1993). The operational definition of it in this research context is the individual's perception that e-textbook for agricultural education is easy to use.
- Attitudinal variables
- Attitude towards the content quality: this variable refers to an individual's belief to content quality that can act as either inhibitor or facilitator of acceptance and use of technology (Lin and Wu, 2002; Khanh and Gim, 2014). In this research context, this variable represents an individual's belief to how to be the content quality of e-textbook.
- Attitude towards using: this variable was omitted by Davis (1989) in final model TAM because it played a weak meditating role between perceived usefulness and intention (Venkatesh, 2000). Despite, some studies have been highlighted its effect on intention (Cakır and Solak, 2015; Huang et al., 2007). The operational definition of it in this research context is the feeling or opinion about using e-textbook or a way of behaving it.
- Behavioral intention to use

This variable reflects how hard a person is willing to perform the behavior (Ajzen, 1991). Intention reflects the effort that people plan to exert in order to perform the behavior (Fishbein, 1980). An operational definition of it to this research context is the individual's perceived likelihood that he/she will use e-textbook.

Fig. 1 represents our research model that variables are categorized into four categories to better understand the model.

4. Materials and methods

This research is an applied, non-experimental, and descriptive-correlational research. This study was conducted for pioneer farmers who participated in the six educational workshops as a part of implementing a joint project between JICA and ACECR in Kermanshah province as a pilot project. The subjects of workshops were related to the contents of CHiLO books. Details of the workshops were shown in Table 1.

After holding the workshops, in order to familiarize participants with e-textbooks for agricultural education, approximately 15 min of explanations related to CHiLO books were provided and a sample was shown.

The total number of pioneer farmers participating in six workshops as a statistical population was 143 people that 42 people were sampled randomly using the Cochran formula. Then data were collected by a questionnaire that was distributed as a hard copy by the researchers. The return rate of questionnaires was 83 percent.

The questionnaire consists of 38 items (questions) that are divided into two main sections. The first section represents the respondent's personal information. The second section represents the determinants of users' behavioral intention to use e-textbooks. A five-point Likert scale comprised of strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1), was used to measure all of the items except a three Likert scale has been used for measuring the use of digital devices that, as: low (1), moderate (2), and high (3).

For measuring variables, we used validated items from prior research. Table 3 presents a list of items for all of the variables. Perceived usefulness, perceived ease of use, and behavioral intention were measured using items adapted from Davis (1989) and Davis et al. (1989). Operationalization of the computer anxiety was consistent with Venkatesh (2000). Attitude toward the content quality was measured

Table 7
One-sample T-test.

Variables	Mean (*M*)	Test value	*t*
Use of digital devices	2.17	1.5	5.720**
Computer anxiety	2.18	3	−5.868**
Perceived usefulness towards e-textbooks for agricultural education	4.3	3	10.614**
Perceived ease of use towards e-textbooks for agricultural education	4	3	8.692**
Attitude towards the content quality of e-textbooks for agricultural education	4.45	3	20.505**
Attitude towards using e-textbooks for agricultural education	4.1	3	12.760**
Behavioral intention to use e-textbooks for agricultural education	4.3	3	14.570**

** $p < .01$.

Table 8
Model Summary and *F*-value.

Model	Variables	R^2	R^2_{adj}	*F*
1	Attitude towards the content quality of e-textbooks for agricultural education	0.501	0.486	33.144**
2	Attitude towards using e-textbooks for agricultural education	0.585	0.559	22.553**

** $p < .01$.

using items adapted from Alharbi and Drew (2014). Use of digital devices was measured using three researcher-made items. For measuring attitude towards using, we have used items from Huang et al. (2007) and some researcher-made items.

A pre-test of the questionnaire was conducted. The sample size for pre-test was 15 participants. The reliability and validity of the scales were consistent with prior research. Furthermore, items of the questionnaire were reviewed by experts for validity. The Cronbach's alpha coefficient was estimated for the reliability of scales using SPSS software which is depicted in Table 2. Values of alpha for all variables were above 0.7 that show the mentioned variables have suitable reliability. For analysis of data, we used SPSS and SmartPLS 3. Descriptive statistics, correlation analysis, multiple regressions were used to answer the research questions. Also, we used PLS-SEM because it assesses the reliability and the validity of the measurement items of each latent variable of the model and at the same time it estimates the relationships among the latent variables and the dependent variable (Barclay et al., 1995).

5. Results

5.1. Descriptive statistics

On average, participants were approximately 40 years of age in this survey. It was found out that a high proportion of participants (80%) were male. Among participants, 91.4% have been educated in BSc degree and higher, 8.6% were diploma degree or lower. Other descriptive statistics have been represented in Table 3.

Table 4 shows the list of items of variables with descriptive statistics including mean (M), standard deviation (SD) and coefficient of variation (CV). Items ranked by value of CV.

5.2. Correlation matrix of the variables

The correlation coefficient represents the linear relationship between two variables. Table 5 shows the results of the correlation coefficients of the variables. From the results in Table 5, there is a strong correlation between attitude towards the content quality of e-textbooks and behavioral intention to use it (0.708); perceived usefulness towards e-textbooks and perceived ease of use towards e-textbooks (0.716); and attitude towards using e-textbooks and behavioral intention to use it (0.631).

According to the correlation matrix:

- There is a positive, direct and significant relationship between age and work experience in an agricultural field that the *P*-value is less than 0.01.
- There is a positive, direct and significant relationship between perceived usefulness towards e-textbooks and perceived ease of use towards e-textbooks that the *P*-value is less than 0.01.
- There was a positive, direct and significant relationship between perceived usefulness towards e-textbooks and attitude towards the content quality of e-textbooks that the *P*-value is less than 0.05.
- There is a positive, direct and significant relationship between perceived ease of use towards e-textbooks and attitude towards the content quality of e-textbooks that the *P*-value is less than 0.01.
- There is a positive, direct and significant relationship between perceived ease of use towards e-textbooks and attitude towards using e-textbooks that the *P*-value is less than 0.05.
- There is a positive, direct and significant relationship between perceived ease of use towards e-textbooks and behavioral intention to use e-textbooks that the *P*-value is less than 0.01.
- There is a positive, direct and significant relationship between attitude towards the content quality of e-textbooks and attitude towards using e-textbooks that the *P*-value is less than 0.01.
- There is a positive, direct and significant relationship between attitude towards the content quality of e-textbooks and behavioral intention to use e-textbooks that the *P*-value is less than 0.01.
- There is a positive, direct and significant relationship between attitude towards using e-textbooks and behavioral intention to use e-textbooks that the *P*-value is less than 0.01.
- There is a negative, direct and significant relationship between age and perceived ease of use towards e-textbooks that the *P*-value is less than 0.01.

Table 9
The estimate of regression parameters output.

Model	Unstandardized Coefficients		Standardized Coefficients	*t*
	B	*Std.error*	*β*	
Constant	−0.192	0.685		−0.280
Attitude towards the content quality of e-textbooks for agricultural education (ACQE)	0.677	0.178	0.517	3.795**
Attitude towards using e-textbooks for agricultural education (AUE)	0.373	0.147	0.347	2.544*

** $p < .01$.
* $p < .05$.

Table 10

Standardized loadings, composite reliabilities, and average variance extracted.

Variables	Indicators	Outer loading	t-value	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital devices anxiety (DDA)	Computers make me feel uncomfortable	0.856	2.394*	0.852	0.592
	Working with a computer makes me nervous	0.684	2.159*		
	I'm worried when I want to take part in courses that deal with computers	0.819	2.785**		
	Computers scare me	0.708	2.190*		
Perceived usefulness towards e-textbooks for agricultural education (PUE)	Using the e-textbook facilitates my agricultural activities	0.836	2.867**	0.928	0.763
	Using the e-textbook improves my performance in agricultural activities	0.917	7.386**		
	I found that the e-textbook is useful in my agricultural activities	0.871	6.854**		
	Using the e-textbook help me to access rapidly to agricultural information	0.869	5.229**		
Perceived ease of use towards e-textbooks for agricultural education (PEUE)	I find it easy to get the e-textbook to do what I want it to do	0.850	19.148**	0.892	0.675
	It is easy for me to become skillful at using e-textbook	0.890	17.621**		
	Interacting with the e-textbook does not require a lot of my mental effort	0.781	12.206**		
	My interaction with the e-textbook is clear and understandable	0.758	4.966**		
Attitude towards the content quality of e-textbooks for agricultural education (ACQE)	Content of e-textbook should be understandable for me	0.898	22.519**	0.896	0.638
	Content of e-textbook should be applicable for me	0.842	19.053**		
	Content of e-textbook should be interesting for me	0.843	12.149**		
	Content of e-textbook should be regular	0.700	6.282**		
	Content of e-textbook should be up to date	0.635	5.776**		
	Content of e-textbook should consider the details of subjects	0.517	remove		
	Videos and images into content should have educational effects	0.506	remove		
Attitude towards using e-textbooks for agricultural education (AUE)	In my opinion, it would be very desirable to use e-textbook	0.480	remove	0.896	0.606
	In my opinion, learning by e-textbook would be entertaining	0.718	4.877**		
	I would like to use e-textbook	0.909	45.743**		
	I hold a positive evaluation of e-textbook	0.884	19.788**		
	I think e-textbook provide an opportunity that I use it anywhere	0.789	9.198**		
	I think e-textbook provide an opportunity that I use it at anytime	0.782	12.959**		
	I prefer e-textbook to face to face education for learning	0.449	1.956***		
	I think learning by e-textbook would be more than face to face education	0.589	remove		
Behavioral intention to use e-textbooks for agricultural education (BIUE)	Assuming I had access to the e-textbook, I intend to use it.	0.922	25.895**	0.950	0.862
	If I access the e-textbook, I predict that I would use it.	0.946	19.063**		
	I plan to use the e-textbook in the next $< n > $ months	0.918	32.342**		

Table 11
Fornell-Larcker Criterion.

	ACQE	AGE	AUE	BIUE	DDA	EDU	PEUE	PUE	UDD	WEA
ACQE	0.799									
AGE	−0.093	**1.000**								
AUE	0.690	−0.153	**0.778**							
BIUE	0.774	−0.002	0.746	**0.929**						
DDA	0.422	0.009	0.192	0.204	**0.770**					
EDU	0.161	−0.082	0.075	0.113	0.028	**1.00**				
PEUE	0.604	−0.454	0.596	0.535	0.153	0.347	**0.822**			
PUE	0.489	−0.327	0.389	0.347	0.096	0.384	0.729	**0.874**		
UDD	0.109	−0.105	0.222	−0.005	−0.013	0.553	0.237	0.190	**1.000**	
WEA	0.152	0.665	0.195	0.225	−0.043	−0.248	−0.362	−0.302	−0.071	**1.000**

Table 12
Results of structural model.

Path	Path Coefficient (β)	t-value	Sig.
ACQE - > BIUE	0.507	2.087	0.038*
AGE - > BIUE	0.111	0.667	0.505
AUE - > BIUE	0.442	2.013	0.045*
DDA - > BIUE	−0.110	0.530	0.597
EDU - > BIUE	0.147	0.994	0.321
PEUE - > BIUE	0.143	0.521	0.603
PUE - > BIUE	−0.137	0.893	0.372
UDD - > BIUE	−0.236	1.448	0.149
WEA - > BIUE	0.014	0.063	0.949

$R^2 = 0.748$ R^2 *adjusted* = 0.658

- There is a negative, direct and significant relationship between work experience in an agricultural field and perceived ease of use towards e-textbook**s** that the *P*-value is less than 0.05. With the increase in work experience in an agricultural field, people think that the use of these e-books is more difficult for them. This is because there is a significant and positive correlation between age and work experience in the field of agriculture.

5.3. Comparing means between groups in terms of the variables

According to the Mann-Whitney *U* test (Table 6):

- People who have a master degree or higher, use digital devices more than other people.
- Mean of use of digital devices in the group which have already used e-books (and not necessarily CHiLO books) was higher than the group of no hands-on experience in the use of e-books. This difference of means was significant statistically.
- Means of perceived usefulness and perceived ease of use in a group which has already used e-books were more positive than a group of no hands-on experience in using e-books. These differences of means were significant statistically.
- In the comparison of means across two groups in terms of other variables, *P*-values were greater than the significance level (0.05), and the difference of means was not significant.

Table 7 compares the means of variables with a hypothetical value. The values determined by the viewpoints of researchers.

The P-value of all tests is smaller than the level of significance 0.01. It indicates that:

- Mean of use of digital devices among respondents are significantly different from moderate level (Test value = 1.5). The positive *t* scores imply that the sample proportion is greater than the hypothetical value.
- Amount of computer anxiety among respondents is significantly different from moderate level (Test value = 3). The negative *t* score

implies that the sample proportion is smaller than the hypothetical value. This status is desirable.
- Perceived usefulness and perceived ease of use towards e-textbooks among respondents are significantly favorable.
- Attitude towards the content quality of e-textbooks and attitude towards using them are significantly positive.
- Mean of behavioral intention to use e-textbooks among respondents are significantly different from moderate level (Test value = 3). The positive *t* scores imply that the sample proportion is greater than 3.

5.4. Multiple regressions for prediction of the variability of behavioral intention

A stepwise method is selected to find the variables that are directly affecting the dependent variable. Attitude towards the content quality of e-textbooks for agricultural education and attitude towards using e-textbooks for agricultural education together explain variability in the dependent variable. From Table 8, we found that R^2 is 0.585 and adjusted R^2 is 0.559. We, therefore, conclude that the model explains approximately 56% of the variability in behavioral intention to use e-textbooks for agricultural education among respondents. For concluding regarding the usefulness of the model, we cannot solely rely on adjusted R^2 value, we used the ANOVA test. From the results in Table 8, we concluded that the model is a good fit (*F*-value: 22.553) as the *P*-value is 0.000. The significance level of *F*-value indicates that the regression equation can be generalized to the statistical population.

The output in Table 9 provides both unstandardized and standardized coefficients. The coefficients of attitude towards the content quality and attitude towards using e-textbooks are all positive which indicate that they have positive effects on the behavioral intention. Standardized coefficients indicate that attitude towards the content quality of e-textbooks for agricultural education has the strongest effect on the behavioral intention to use e-textbooks for agricultural education in this multiple regression analysis. Therefore, 0.517 standard deviations of the dependent variable will change one standard deviation increase in attitude towards the content quality of e-textbooks for agricultural education. Further, the estimated model is:

$$BIUE = (−.192) + .677ACQE + .373AUE$$

5.5. Structural model results

For testing hypotheses (paths) in the theoretical model (Fig. 1), we also used PLS that simultaneously evaluates theory and data (Aibinu and Al-Lawati, 2010). Based on the Chin et al. (1998), we tested the significance of the *t*-value of the path coefficients of the theoretical model using the bootstrapping method. It is available for testing hypothesis and a strong alternative to statistical inference when parametric assumptions are in doubt such as in cases of small samples (Mooney and Duval, 1993). It is necessary to note that for testing our theoretical model, we deleted the construct of "hands-on experience with e-books" because this deletion improved the model fit and the

composite reliability.

For analysis of individual item reliability in the measurement model, the standardized loadings were assessed (Table 10). A loading of 0.7 was used as a cutoff point. Items with loadings of less than 0.7 were dropped. But, the two items with loadings respectively 0.449 and 0.635 were kept because both of the items were important from the viewpoint of researchers. Thus the items are reliable and the standardized loadings are statistically significant. In Table 10, the composite reliabilities are presented. Using 0.7 benchmark for the composite reliability all the constructs are acceptable. Hence, the measurement items are appropriate for their respective latent variables.

Further, we used the average variance extracted (AVE) to evaluate the convergent validity of the latent variables (Table 10). Based on Hair et al. (2017), AVE should be higher than 0.5. In this study, AVEs are in an acceptable range. Table 11 demonstrates the square root of AVE of each latent variable that based on the rule it should be larger than the correlation of two latent variables. The results show that the latent variables are different from each other.

The results in Table 12 demonstrate that the standardized beta coefficients for ACQE and AUE (0.507 and 0.442) with a R^2 of 0.658 for BIUE. These results imply that one standard deviation increase in ACQD will impact BIUE directly by 0.507.

6. Discussion and conclusion

The current research expands our understanding of factors influencing users' behavioral intention for using e-textbooks in agricultural education. Venkatesh (2000) states that "research on TAM has led to various applications and replications. However, with the exception of some of Davis' work (e.g., Davis and Venkatesh, 1996), research has not focused on understanding the determinants of TAM's key constructs." Therefore, in this research, we attempt to go beyond the two main determinants of TAM and have analyzed other variables including system-independent variables such as the use of digital devices, computer anxiety, and hands-on experience with e-books; attitudinal variables such as attitude towards the content quality; and some individual factors (age, education, and work experience).

According to the moderate average of preference of respondents to use e-textbooks instead of face to face education and also respondents' conceptions towards learning by e-textbooks, it is suggested that e-textbooks come with blended learning approaches.

Whereas the use of smartphones among respondents is high and given Table 7, respondents have favorable perceptions towards e-textbooks acceptance for agricultural education, in addition, behavioral intention to use e-textbooks is high. Therefore, it is suitable that the capacity of e-textbooks is applied to agricultural extension and education in the same communities.

According to all of the results of this study, e-textbooks for agricultural education could be designed, developed and promoted widely at the national level in order to enhance productivity in the agricultural sector, knowledge and skills of farmers, and to motivate farmers to start new activities and the use of new technologies in this sector.

Based on the results of Table 4 regarding variable of attitude towards the content quality, the following criteria are proposed to design and develop e-textbooks contents in the future, respectively:

- to be up-to-date
- to be understandable
- to be applied

The results showed that the attitude towards the content quality of e-textbooks has the highest effect on users' behavioral intention than other factors. This finding was in accordance with Khanh and Gim (2014), Connetha (2007), Shih and Fang (2004), and Lin and Wu (2002). Also, a more positive attitude towards the content quality creates a better perception of the usefulness in accordance with the

previous studies by Khanh and Gim (2014), and Shih and Fang (2004), and attitudes towards the use of e-textbooks in accordance with Shih and Fang (2004).

We found the relationship between perceived usefulness towards e-textbooks and perceived ease of use towards e-textbooks. This finding was in agreement with previous studies (Erasmus et al., 2015; Chung et al., 2015; Shroff et al., 2011; Venkatesh and Bala, 2008; Davis, 1993, 1989; and Davis et al., 1989). Therefore, in order to improve users' perceived usefulness and ease of use, we propose a user-centered design without complexity for e-textbooks. Given the relationship between perceived ease of use and attitude towards using e-textbooks, a user-friendly environment for these books strengthens the attitude towards using ones. This finding was in agreement with previous studies (Shroff et al., 2011; Gumussoy et al., 2007; Legris et al., 2003; Moon and Kim, 2001; Gefen and Straub, 2000; Davis et al., 1989). Our findings indicate that a more positive attitude of users toward using e-textbooks increases the commitment to use in the future. Also, Wu and Chen (2017), Cakır and Solak (2015), Erasmus et al. (2015), Lee (2010), and Huang et al. (2007) emphasize this result.

It is worth noting that the perceived ease of use of e-textbooks had a significant positive relationship with the behavioral intention to use them. Findings of Wu and Chen (2017) support this result. On the other hand, with increasing age, people think that using these books is harder for them. This finding is in accordance with Wu and Chen (2017), Venkatesh and Bala (2008), and Jain and Hundal (2007). Therefore for increasing the rate of use of e-textbooks in educational positions, it is better to hold short-term courses older learners regarding the introduction of these books and method of use of them in more details.

In this research, the perception of people towards ease of use of e-textbooks was related to previous experiences of the use of e-books. Therefore, using these books in the JICA-ACECR joint project is also an experience for them. Eventually, any attempt to increase the engagement of people with these books plays an important role in the success of future projects.

In this research, behavioral intention to use e-textbooks for agricultural education did not depend on education level. This result is not consistent with Carrer et al. (2017), Kalba (2008), Alvarez and Nuthall (2006), DiMaggio and Cohen (2003), and Woodburn et al. (1994).

This indicates that in our target community, literacy of using mobile apps is not related to education level. Therefore, this result is led to decrease concern about the use of e-textbooks by people with low literacy and increase the number of users that could contribute to the response to UNESCO's international calls for "Lifelong Learning" and "Education for All".

7. Limitations and recommendations for future research

The variables under investigation accounted for 56% of the variability in the behavioral intention to use e-textbooks (CHiLO books) for agricultural education. Although this amount is acceptable in behavioral sciences, certainly there are other factors which should also be taken into account and entered into the model. Future research should also consider new factors in the research model.

In spite of these limitations, this study provides insights into main determinants that contribute towards individuals' intention to use M-learning tools such as e-textbooks in the agricultural sector and education in both Iran and worldwide. The findings provide important implications for agriculture managers, agricultural extension agents, content developers, and mobile learning system developers.

Acknowledgments

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