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DETECTING SIMILARITIES AND DIFFERENCES AMONG INDIANS' AND GREEKS' PERCEPTION TOWARD ARTIFICIAL INTELLIGENCE ENABLED E-LEARNING

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ABSTRACT

Purpose: The current study is looking at validation and comparing Artificial Intelligence (AI)-enabled e-learning model based on the technology acceptance model (TAM) and as given by Kashive et al. (2020). The data are collected from India and Greece for personal learning network (PLN), personal learning profile (PLP), and personal learning environment (PLE) and their impact on perceived ease of use (PEOU), perceived effectiveness (PE), and perceived usefulness (PU) impacting the intention to use e-learning platform. **Design/methodology/approach:** The data was collected from 100 respondents from India and 100 respondents from Greece who have learned through e e-learning. The questionnaire was adapted from Kashive et al. (2020) study. Structural equation modeling (SEM) using smart PLS was used to create a model and compare different variables and their relations with the final intention to use e-learning. **Findings:** For the Greece sample, all three aspects of TAM i.e., PEOU, PE, and PU came significant while for India only PEOU Affected attitude and satisfaction level. PLP impacted PEOU, PE, and PU in Greece but only PE for India. For Greece learners, PU mediated while for India PEOU mediated the relation between PLE and attitude and satisfaction. PLE impacted only PU for Greece while it impacted both PEOU and PU for India. PEOU and PU both mediated the link between PLP and attitude and satisfaction

in the Greece sample, but no mediating effect was seen in India. PLN did not come significantly for both countries. There were differences in perception among gender in both countries. **Research limitations:** As Hofstede's framework of national culture was used to compare among two countries the individual-level analysis could be used as individuals may have their cultural values different from national cultural values. **Originality /value:** The current research has compared user perception of AI-enabled E-learning model as given by Kashive et al. (2020) study among two cultures namely Greece and India and investigated the impact of culture on Artificial intelligence for e-learning context.

Keywords: Personal learning network (PLN), Personal learning Profile (PLP), Personal Learning Environment (PLE), E-learning, Artificial Intelligence (AI), Hofstede's Culture.

INTRODUCTION

The current Covid-19 situation is making all of us sit at home, work, and learn from home. Many students are learning from e-learning platforms and schools have completely transferred their teaching online. E-learning is catching up all around the world in higher education institutions and students have a positive attitude towards e-learning (Johnson et al.,2021). The e-learning opportunities are enormous as it provides various benefits

like overcoming the difference in time and physical space of the educational system (Bates,2005). Though e-learning provides various advantages it also cannot keep the learner motivated and motivation is a critical part of any learning including online learning (Bekele,2010; Jones, Issroff, Conole & Oliver, 2007). Information and communication technologies (ICT) plays important role in enhancing the learning process of students, as their effectiveness will be decided by the level of acceptance and degree of usage within the student population (Johnson et al.,2021; Teo,2014).

The acceptance and usage are finally decided by the user's perception about technology and the knowledge and skills of computers (Al-ahtani,2014; Tarhini, Hone, & Liu,2015; Wong, Teo, & Goh, 2015). The technology acceptance model TAM (Davies,1989) is a widely used model to explain technology acceptance. Various studies have explained the TAM framework for general usage (Venkatesh & Bala,2008), and others have used to explain its application in e-learning context (Tarhini, Hone, & Liu,2013c; Sharma, Chandel, Govindaluri, & FakhrEIDin,2014; Hu & Hui,2012; Alshare, Freeze, Lane, & Wen, 2011). All these studies however have focussed on developed countries (Al-Gahtani,2014; Teo,2010; Tarhinin, Hone, & Liu,2014a). There are very few studies that have investigated local context or in developing countries (Li & Kirkup,20017). TAM (Davies,1989) is based on the theory of reasoned action (Ajzen and Fishbein,1975). As per this theory, the behavioral intention to use technology depends upon the individual perceived usefulness and perceived ease of use (Venkatesh and Davies,2000)

Culture can play an important predictor of TAM, but truly little research is seen in this direction. There is also truly little research done in the area of the effect of

culture on e-learning and teaching (Ya-WenTeng,2009; Alas & Elenurm,2008; Sanchez-France et al.,2009; Hannon, & D'Netto,2007). McCoy, Galletta & King (2005) have suggested that there is a shift in assumption as suggested by Hofstede's cultural framework over the years but still it is the most widely used framework when talking about culture studies in any context. McCoy et al. (2005) suggested using Hofstede's (1980) individual-level scale (Dorfman & Howell,1988), and Srite and Karahanna (2006) used it in their two studies of understanding the use of technology. As per their suggestion effect of culture on an individual depend upon his/her level of engagement and involvement with the values of their own culture. The studies have compared the TAM model across culture, but no study is seen which has compared culture for use of Artificial Intelligence (AI) in an e-learning context.

The use of Artificial Intelligence (AI) has grown tremendously in the last few years and its e-learning application has also been explored. Kashive et al. (2020) conceptualized the AI-enabled E-learning model wherein they integrated components of AI like personal learning profile (PLP), personal learning network (PLN) and personal learning environment (PLE) adopted from Montebello (2017) framework into TAM model for e-learning context in India. The study showed that PLE affected both perceived ease of use (PEOU) and perceived usefulness (PU) while PLP affected perceived effectiveness. PEOU showed mediating effect between PLE and attitude and PLE and satisfaction. The study implication is much folded as it emphasizes enhancing the personal learning environment of users and creating personalized learner profiles to improved perceived ease of use (PEOU), perceived usefulness (PU), and perceived effectiveness (PE). The objective of the current research is to see if the AI-enabled E-learning model as

suggested by Kashive et al. (2020) can be tested in Greek culture and what are the similarities observed between its application for two distinct cultures. This will help us to test its universal appeal as a generalization of theory testing and model building. The differences seen may lead us to conclude how some aspects of the model are unique and can be localized to a specific cultural context. Till now no study has compared AI-enabled e-learning models across cultures. The study is trying to find out the answers to the following questions:

R1: Can you replicate an AI-enabled E-learning model in a Greece context like India?

R2: What are the similarities and differences between components of the AI-enabled E-learning model in Greece and India?

LITERATURE REVIEW

i. Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was first introduced by Davies (1989) and the most widely used framework for understanding technology use and acceptance (Veiga et al.,2001). The two important variables used in the model are perceived usefulness (PU) and perceived ease of use(PEOU). For use of technology, perceived usefulness captures the instrumental dimension, while perceived ease of use is described by hedonic experience (Tarhini et al, 2017). Other researchers have added new constructs to TAM like (Warkentin, Gefen, Pavlou, & Rose, 2007) investigated the adoption of e-government in citizens across different countries by taking trust, perceived risk, culture, and perceived behavior control. TAM is applied to e-learning by many researchers and PEOU and PU have been

linked to users' behavior intentions (BI) (Sheng, Jue, & Weiwei,2008; Liu, Liao, & Pratt, 2009). It is seen that more learners perceive usefulness and ease of use higher is the chances of them being satisfied and having a positive attitude towards e-learning and allowing them to use it (Arbaugh, 2002; Arbaugh & Duray,2002).

ii. Impact of culture on Technology Acceptance

Culture values may bring difficulty in adopting any technology as it is decided by values and beliefs of individual and group of people which may impact their behavior by either increasing or decreasing the rate of implementation of technology (Veiga et al.,2001). Maitland and Bauer (2001) suggested that technology adoption and implementation do depend on national culture values while Meng et al. (2009) pointed out that national culture values are difficult to predict the behavior of individuals as uniformity of individual behavior culture may be difficult to achieve. Many studies have focussed on the technology acceptance model (Ooi and Tan,2016). Al-Gahtani et al. (2007) investigated the effect of culture on individuals' level of technology acceptance as cultural values play important role in deciding the use of technology (Westjohn et al.,2009). They used Hofstede's culture value framework to study the acceptance of technology and culture of hotel employees. Though individuals within the culture may have a different level of acceptance for technology overall culture does play important role in deciding this acceptance. The different cultures of individuals do decide on the use of technology and its acceptance (Klien,2004; Hillier,2003), and more studies are done in this area (Srite and Karahanna,2006; Kim et al.,2018). Research has shown that the adoption of technology and users' experience differs as per the cultural values depending upon their response to

completely new technology (Yoo et al.,2011).

Hofstede (1989) gave national culture values as power distance, long-term orientation, uncertainty avoidance, collectivism, and masculinity. Relations between power distance and uncertainty avoidance on technology acceptance were discussed by (Gao et al,2018; Karl,2018) while collectivism, long-term orientation, and masculinity and its impact on technology acceptance were studied by Sunny et al (2019). As per Kovacic (2005), the two dimensions affecting technology use is collectivism and masculinity. Countries with long-term orientation investigate the future while those on low on long-term orientation look at past and present (Hofstede and Hofstede,2005). Some studies like Yoon's (2009) study have found long-term orientation and consumer trust and re-purchase intentions are related. Masculinity is related to achievement orientation and shows the role of gender in society (Tahrini et al.,2017). Countries high on masculinity focus on assertiveness success (Hofstede and Hofstede,2005) while those low on masculinity focus on relationships and life quality.

Veiga et al.(2001) have found that collectivism and long-term orientation do affect perceived usefulness and ease of use for a particular technology. Srite and Karahanna (2006) have also shown that national culture does affect perceived ease of use and usefulness but emphasize that it may work at the individual level. Ayoun et al (2009) and Ayoun et al.,(2010) have seen that collectivism and masculinity affect strategic management as observed by hotel managers. Tarhini et al. (2017) studied the impact of cultural values at individual levels on the adoption of tools for e-learning used by students and showed that this relationship is stronger for females than males and higher collectivist cultures. This suggests that in high collectivism culture, peer group

influences students for technology usage. Some studies have explored the role of perceived usefulness in moderation between satisfaction and word of mouth in restaurants (Yang,2017).

a. Power distance (PD)

Power distance (PD) shows the extent to which people accept the difference in power between the level of society (Hofstede,1980). Many studies have suggested the role of PD as a moderator between SN and BI (McCoy, Everard & Jones,2005; Srite & Karahanna,2006; Diney, Goo, Hu & Nam,2009). Countries with higher cultural values of PD will get more influenced by superior and referent others for adoption of technology. McCoy et al.(2005) studied the use of e-mail among Uruguay and USA respondents and found that the relation between SN and BI was stronger for the Uruguay sample due to cultural differences including PD. They also showed that PD act as a moderator between PU and BI suggesting that the relationship would be stronger for cultures with lower PD. This can be explained such that in low PD culture individuals are not affected by superior ideas regarding the use of technology and may use their judgment and intention looking at the usefulness of the technology. Li et al. (2009) when comparing individual-level differences between China and the USA did not see any differences moderating the effective use of web portals. Srite and Karahanna (2006) found that PD was significantly moderating the relation between SN and BI but in opposite direction.

b. Masculinity/femininity

Hofstede (1980,1991,2001) masculinity/femininity (MF) culture dimensions show that those who are high on masculinity (low femininity) focus more on work goals like achievement and earnings while those cultures low on

masculinity focus more on traditional roles and will be people-oriented giving importance to relationships. Hence many studies have suggested that SN and BI are related more strongly to feminist culture (Diney et al.,2009; Srite and Karahanna,2006). Srite and Karahanna (2006) found an opposite effect for a significant effect of PU on BI showing for US sample (more feminine) while no significant effect on Chinese sample (more masculine) while PU is an instrumental behavior, PEOU investigates a hedonic experience for using technology. Srite and Karahanna (2006) suggest that PEOU and BI will be strongly related to high feminine culture as they emphasize on pleasant work environment and focus on interpersonal relationships. Other studies have also confirmed this relationship (Srite,2006; McCoy et al.,2007).

c. Uncertainty avoidance (UA)

As per Hofstede (1980), UA shows the level of uncertainty and ambiguity tolerated. The stress level for an individual may increase more for high UA when uncertainty in the environment increases than individuals having low UA (Udo et al.,2012). Studies have postulated a direct relation between UA and technology adoption with high UA culture less accepting the technology (Zakour,2004). Sanchez-Francco et al. (2009) found that UA moderates the relation between PEOU and PU and BI in the education sector as this aspect may decrease the uncertainty and therefore shows greater influence in high UA samples. They conducted the study between Nordic culture (high individualism with low UA) with Mediterranean culture (low individualism with high UA) and showed that PEOU moderated more with BI in Mediterranean culture having high UA. But it was seen that for PU the relation came out to opposite and PU affected more in the Nordic sample (low UA) that may due to

the influence of individualistic culture which was found to be higher in the Nordic sample. McCoy et al.(2007) study also suggested the moderating role of PU and PEOU with BI in high UA culture and not in low UA.

d. Individualism/collectivism

Hofstede (1980) suggested that individualism/collectivism(IC) refers to the extent to which people are part of a group as within an individualistic culture people are more interested in their own goals and achievement while in a collectivist culture people value loyalty towards a group than their gains. Lee, Choi, Kim, and Hong (2007) have also seen that individualism is positively related to both PU and PEOU while other studies have shown IC moderating between PU and BI (McCoy et al.,2005; Sanchez-Fransco et al.,2009). As individualistic culture emphasized more on goal attainment and achievement and hence it will be an important predictor for technology adoption. As per Sanchez-Fransco et al. (2009) study, the relations for PU and BI are stronger in Nordic culture (individualist) than in the Mediterranean sample (collectivism culture). Few studies have been found to explore the relation between PEOU and BI with IC as a moderator. MCCoy et al. (2007) found a weak link between PEOU and BI for collectivism as people in the culture will follow group norms and take other views in taking up any new technology.

iii. Perceived Effectiveness (PE), Perceived ease of use (PEOU), and Perceived usefulness (PU)

Perceived Effectiveness (PE) is associated with users' belief that e-learning is an effective tool for learning and an important component of any training and learning module

(Huprich,2016). Users who have not at all used e-learning before may feel certain anxiety about its perceived value and overall effectiveness as a learning platform (Fuller, Viccian, & Brown,2006; Liaw & Huang,2013). Perceived usefulness (PU) can be defined as the degree of belief that the use of some system will improve their performance (Davies,1989). As e-learning, improves the flexibility of time and space and learning at their own pace, it increases the PU among users. E-learning also helps in collaborating and sharing knowledge as it connects the learner to other similar groups (Su-Houn Liu,2009). Similarly perceived ease of use (PEOU) influences students' intention for learning by e-learning mode as it also affects PU and perceived enjoyment (Lee, Cheung, & Chen,2005). As per Gong, Xu, & Yu (2004), PEOU has a direct relation to students' attitudes and PU. Many studies have explored the application of TAM for explaining students' acceptance of e-learning tools (Tarhini, Hone,& Liu.,2014b; Huang, Liaw &Lai,2013). Sharma and Chandel (2013) showed that perceived ease of use directly affect the intention to use a system and other researchers have supported this claim Tarhini, Hone,& Liu.,2013a; Liu et al.,2010; Chang & Tung.,2008;Teo &Noyes,2014).

iv. Attitude and satisfaction for e-learning

Attitude is an important aspect of e-learning and understanding what influences attitude for e-learning is crucial (Su-Houn Liua,2009). Therefore, it is important to use a multidisciplinary approach for understanding attitude towards e-learning (; Liaw,2007). There is a need to build an instrument that measures attitude looking at a different aspect of the perception of the user (Wang,2003). Satisfaction is studied by many researchers when looking at system

success (Esterhuysen, Scholitz, &Venter,2016; Liaw &Huang,2013). As per Chen (2010) as e-learning is considered a system. As e-learning is a very user-oriented system, the satisfaction level of users with the system decides their success (Shee &Wang,2008). The system implementation is governed by the pleasure which is decided by the students, teacher, technology, environment, and system design (Teo,2014). Hence it can be said that the higher the satisfaction level of the user more is the more chances for them to use it (Liaw & Huang,2013).

Hypothesis 1

H1a: Perceived ease of use (PEOU) for e-learning is positively related to the attitude of a learner in Greece and India.

H1b: Perceived ease of use (PEOU) for e-learning is positively related to satisfaction of a learner in Greece and India.

Hypothesis 2

H2a: Perceived effectiveness (PE) for e-learning is positively related to the attitude of a learner in Greece and India.

H2b: Perceived effectiveness (PE) for e-learning is positively related to satisfaction of a learner in Greece and India.

Hypothesis 3

H3a: Perceived usefulness (PU) for e-learning is positively related to the attitude of a learner in Greece and India.

H3b: Perceived usefulness (PU) for e-learning is positively related to satisfaction of a learner in Greece and India.

v. Intention for using e-learning

Finally, the success of any e-learning module will depend upon its usage (Esterghuysen et al.,2016; Mohammadi,2005). Research has investigated factors that improve the experience of using any particular system for future use (Chu & Chen,2016; Cheung

& Vogel,2013). Many factors like the usefulness of technology (Davies,1989; Jacques et al.,2009), openness to experience, and subjective norms (Schepers & Wetzels,2007), and perception for enjoyment (Wang et al.,2010) are related to behavior intentions for technology use. The behavioral intention in TAM is a particularly important factor to be considered as it decides the usage of technology and individual readiness to perform a certain task. Both PEOU and PU impact technology usage indirectly affecting user behavior. The behavioral intentions and behavioral usage relationship are confirmed by many studies also around e-learning (Chang & Tung,2008; Liu et al.,2010; Teo,2010; Park,2009; Tarhini et al.,2015)

Hypothesis 4

H4a: Attitude towards e-learning is positively related to intention to use e-learning among Greece and Indian learners.

H4b: Satisfaction towards e-learning is positively related to intention to use e-learning among Greece and Indian learners.

vi. Artificial Intelligence (A.I) in e-learning across culture

Artificial intelligence (AI) is used in many areas today and is also applied in the education sector (Beck, Stern, Haugsjaa,1996). AI can provide a lot of benefits for e-learning by providing personalized and user-friendly learning (Laanpere et al.,2014; Lukin et al.,2016). A researcher like (Luckin et al.,2016; Montebello,2017) has suggested that there can be an improvement of learning when applying artificial intelligence in education (AIEd). Researchers have started looking at designing a learning environment with affect abilities that can recognize affect the aspect of the learner

and this can be managed through technology (Blanchard et al.,2007; Conati,2002; Dragon et al.,2008). The emotion and mood of the learners should be taken into consideration when looking at the affected part in AIEd (Blanchard et al.,2009) and there is a need to investigate interpersonal and sociocultural influencer in a learning system (Blanchard et al.,2009; Johnson et al.,2005). Cultural intelligence, defined by Earley and Mosakowski. (2004) is a “seemingly natural ability to interpret someone’s unfamiliar and ambiguous gestures the way that person’s compatriots would”. Blanchard et al.(2005) proposed culturally AWARE (CAWAS) which are based on cultural Intelligent agents (CIA) which can understand and adapt the culture-specific behavior of a learner.

The concept of a smart classroom has been introduced by many scholars which consists of data acquisition, pre-processing system, and high-quality computation ability (Kim, Soyata & Pandey,2018). Usko et al. (2015) have provided the framework for smart classroom ontology having varied maturity levels of smartness helping in better self-learning. "Ambient intelligence classroom" is a concept given by Montebello (2019) that can acquire student information through motion detectors, eye-trackers, keystroke counts, click-stream records, and engagement logs. The assessment in e-learning can also be integrated with AI which can lead to more customized learning by providing details of the progress of each learner (Cope & Kalantzis,2016,2019). The AI-enabled assessment system is provided with an intelligent tutoring system(Nye,2015; VanLenh,2011) which is made up of text analytics and speech mining(Mcnarma et al.,2014; Zhai & Massung,2016), log files, and clickstreams for finding user success (Crossley et al.,2016), gamification and simulators for generating

engagement (Misley et al., 2014; Shute & Ventura, 2013). As per Montebello (2017) AI having components of the personal learning environment (PLE), personal learning profile (PLP) and personal learning network (PLN) can be used for enhancing the learning process of e-learning.

a. Personal learning network (PLN)

Arbaugh (2000) stated that learner satisfaction levels can be enhanced by developing connections and interaction. As per Leon (2013) providing a support system to the learner through web resources and knowledge sharing by the social network is critical and can be significant. Many tools that can be used by the learner to connect to peers are employed effectively (O'Reilly, 2013; Sclater, 2008) and the web has provided immense knowledge to the learner who can share, connect, and collaborate with the social network (Gurzick et al., 2013). Hence it can be hypothesized that PLN will impact PEOU, PE, and PU leading to a more positive attitude and a higher level of satisfaction.

Hypothesis 5:

H5a: Personal learning network (PLN) of AI affects perceived ease of use (PEOU) among Greece and Indian learners.

H5b: Personal learning network (PLN) of AI affects perceived effectiveness of use (PE) among Greece and Indian learners.

H5c: Personal learning network (PLN) of AI affects perceived usefulness of use (PU) among Greece and Indian learners.

H5d: Personal learning network (PLN) of AI mediates the relationship between PEOU, PE, and PU and attitude among Greek and Indian Learners.

H5e: Personal learning network (PLN) of AI mediates the relationship between

PEOU, PE, and PU and satisfaction among Greek and Indian Learners.

b. Personal Learning Profile (PLP)

The general attitude and overall satisfaction level of users can be enhanced when personalized learning can be provided to him/her by understanding their profiles. Personal Learning Profile (PLP) refers to the digital or electronic portfolio of a learner with unique characteristics of learner (Baumgartner, 2012). PLP can be used in an online system to match the right content to the right users as per their needs. For academic purposes, PLP can be the student's personal and academic records showing what are his/her area of interest and achievement over the years (Gooren-Sieber et al., 2012). As per Lorenzo & Ittelson, 2005 this is just one definition out of six categories of PLP and it can be defined as the tool to enhanced self-paced learning by understanding the specific needs of the learner (Dauert et al., 2014). The correct match will also lead to a better motivational level of the learners especially in the online platform (Noesgaard & Orngreen, 2015). Therefore PLP can impact PEOU, PE, and PU in an e-learning environment leading to a better attitude and higher level of satisfaction.

Hypothesis 6:

H6a: Personal learning profile (PLP) of AI affects perceived ease of use (PEOU) among Greece and Indian learners.

H6b: Personal learning profile (PLP) of AI affects perceived effectiveness of use (PE) among Greece and Indian learners.

H6c: Personal learning profile (PLP) of AI affects perceived usefulness of use (PU) among Greece and Indian learners.

H6d: Personal learning profile (PLP) of AI mediates the relationship between PEOU, PE, and PU and attitude among Greek and Indian Learners.

H6e: Personal learning profile (PLP) of AI mediates the relationship between PEOU, PE, and PU and satisfaction among Greek and Indian Learners.

c. Personal Learning Environment (PLE)

A personal learning environment (PLE) is the key to the success of the e-learning module as it brings together PLP and PLN to provide personalized learning to the learner. Both PLP and PLN together can help in building a more conducive environment for learning leading to enjoyable and purposeful learning. As per Charlier et al. (2010), PLE differs from the virtual learning environment (VLE) in the sense that PLE is more centered towards learners in its use and application in comparison to the instructor-centered approach wherein the instructor decides the content, methodology, and pace. The goal of PLE is to encourage and motivate learners to learn as per their likings and pace leading to more self-directed learning (Dabbagh & Kitsantas, 2012). As per Fiedler & Vljataga. (2013), the growth of online learning is urging the practitioner to create a more user-friendly and personalized learning experience. Hence PLE will impact PEOU, PE, and PU leading to a more positive attitude and a higher level of satisfaction among the learners.

Hypothesis 7:

H7a: Personal learning environment (PLE) of AI affects perceived ease of use (PEOU) among Greece and Indian learners.

H7b: Personal learning environment (PLE) of AI affects perceived effectiveness of use (PE) among Greece and Indian learners.

H7c: Personal learning environment (PLE) of AI affects perceived usefulness of use (PU) among Greece and Indian learners.

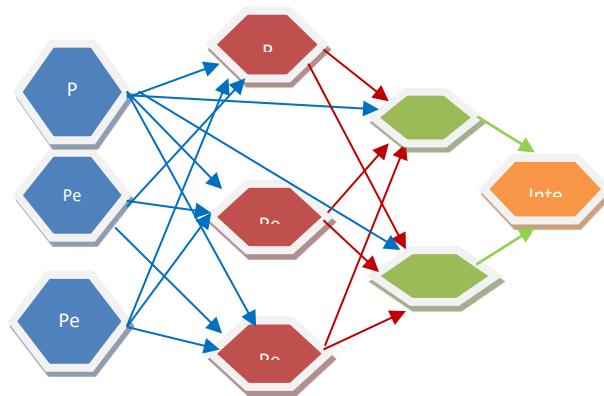
H7d: Personal learning environment (PLE) of AI mediates the relationship between PEOU, PE, and PU and attitude among Greek and Indian Learners.

H7e: Personal learning environment (PLE) of AI mediates the relationship between PEOU, PE, and PU and satisfaction among Greek and Indian Learners.

RESEARCH MODEL

The above hypothesis leads us to build a conceptual model (figure 1) wherein the three components PLP, PLN and PLE enhanced by AI can be integrated with TAM to create a AI enabled E-learning model. They all will affect PEOU, PE and PU leading to more positive user attitude and overall satisfaction. This is in term will lead to higher intention to use E-learning

Figure 1: Conceptual model



METHODOLOGY

a. Sample and Procedure

The data was collected from the respondents who have the opportunity to learn from e-learning modules from two countries namely India and Greece. The perception regarding the use of e-learning concerning aspects of TAM like PEOU, PE, and PU, attitude, satisfaction, and intention along with AI components like PLP, PLN, and PLE were captured through a structured questionnaire. From India 100 responses were taken which had 59% students and 41% working professionals. There were 52 % female and 48 % male respondents. The most prominent age group observed was between 21 to 34 years and 56 % were from junior level, 32 % from middle level, and 12 % from senior level. From Greece, 100 responses were captured using the same questionnaire and taking the same variables. Responses were received from

100 men and women, 52% were female and 48% were male, and 47% were students while 51% were employees and 2% neither of both previous but they had completed an e-learning module. The maximum age group represented was < 21 years. From the working professionals who participated in the research, 17. 6% belonged to the junior level, 49% to the middle level, and 33. 3 % to a senior level. As can be seen in Figure 2 and Figure 3 structure equation modeling (SEM) using smart PLS was used for model building and model path and hypothesis were tested to look into the causal relations between the variables (Urbach & Ahlemann,2010). This approach is variance-based and does not need normalization as in the case of covariance-based approach and is good for the small sample where theory building is an attempt by the research (Hair, Hult, Ringle & Sarstedt,2015).The common method bias was checked through Herman's single factor test and results were quite satisfactory as items did not load on a single factor.

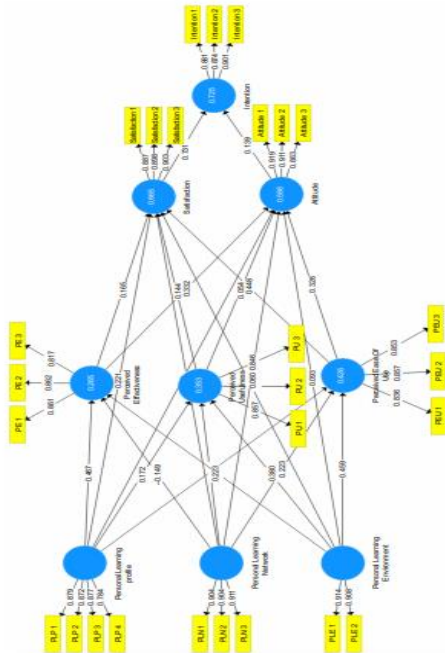


Figure 2: PLS_SEM diagram India

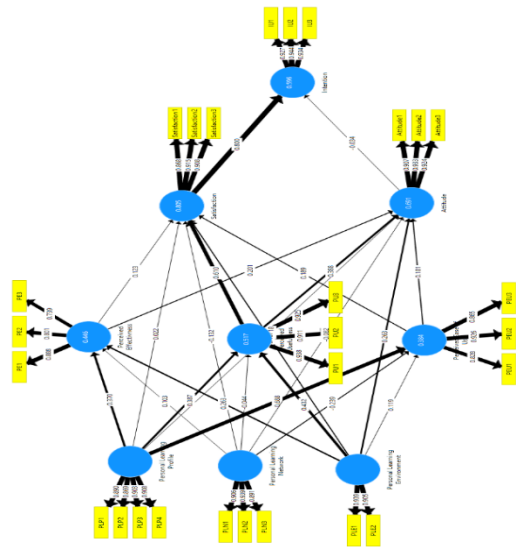


Figure 3: PLS_SEM diagram Greece

b. Measures

Perceived ease of use (PEOU), perceived usefulness (PU), and attitude towards behavioral intention were adapted from the TAM model (Davies,1989). Perceived effectiveness (PE) scale was taken from (Huprich,2016). PEOU, PU, and attitude scale were adapted from (Su-Houn Liu a,2009). User satisfaction and behavioral intention to use were derived from (Esterhuysen, Scholitz, & Venter,2016). PLP, PLN, and PLE scale were adopted from the scale used by Kashive et al. (2020) study which was based on the book 'AI Injected e-learning: The future of online education by Matthew Montebello (2017). PLP was measured through four items, PLN with three items and PLE with two items.

RESULTS AND FINDINGS

As seen in Table 1, as per Hofstede's culture dimensions India is high on power distance showing clear authority and hierarchy in society and organization. India with an intermediate score for individualism, the culture is a combination of collectivism and individualism values. Collectivism concerns remaining loyal to the group and peers and individualism for responsible for their own decisions and life consequences. A high score on masculinity indicates that culture is driven by achievement, drive, and ambitions and there is a display of material gains and

power. India shows medium to low scores for uncertainty avoidance as it is a patience country and tolerance for ambiguity and uncertainty is inculcated to all from childhood. India shows an intermediate score for long term orientation and dominance preference cannot be derived. The low score for indulgence shows that India is a country of restraining and individuals do not believe in spending and enjoying and control their desire for gratification. When we look at Hofstede's dimension for Greece, it is seen that they are intermediate on power distance showing little higher on PD, and hierarchy and power are acceptable. The low score of individualism shows that Greece is a collectivist culture and people follow group norms and remain loyal to the groups. They have extended families and remain helpful to all members of the family and believe in relationship building. Greece has a medium level of masculinity which is showcased by success and drive and men taking care of extended family and considered to be social status for their family. Greece shows a very high score for uncertainty avoidance and hence as a nation, they never get into an uncertain and ambiguous situation and avoid risk. They like to relax and enjoy and look for stability. Greece has an intermediate dimension for long-term orientation and indulgence, so there is no preference between indulgence and restrain.

Hofstede's culture dimension	India	Greece
Power distance (PD)	77	60
Individualism (ID)	48	35
Masculinity (MS)	56	57
Uncertainty avoidance (UA)	40	100
Long term orientation (LO)	51	45
Indulgence (IN)	26	50

Table 1: Hofstede's Culture Dimension of Greece and India
Source: <http://www.hofstede-insights.com/country-comparison>

Cronbach alpha values between 0.6 to 0.7 are considered acceptable and any value greater than 0.8 is very good. But values higher than 0.95 are not necessarily good as this may indicate redundancy (Hulin, Netemeyer, and Cudeck,2001).

The model assessment was done by testing reliability and validity and values above 0.80 were accepted. Table 2 shows that composite reliability values were greater than 0.8 and the average variance extracted was higher than 0.5 (Hair et al., 2014).

	Cronbach's Alpha		rho_A		Composite Reliability		Average Variance Extracted (AVE)	
	India	Greece	India	Greece	India	Greece	India	Greece
Attitude	0.88	0.911	0.894	0.912	0.926	0.944	0.806	0.849
Intention	0.863	0.928	0.867	0.934	0.916	0.954	0.784	0.874
Perceived Ease of Use	0.806	0.844	0.81	0.862	0.885	0.906	0.72	0.763
Personal Effectiveness	0.802	0.741	0.804	0.780	0.884	0.852	0.717	0.658
Perceived Usefulness	0.81	0.915	0.81	0.916	0.888	0.947	0.725	0.855
Personal Learning Environment	0.795	0.826	0.795	0.851	0.907	0.919	0.83	0.850
Personal Learning Network	0.891	0.899	0.891	0.899	0.933	0.937	0.822	0.832
Personal Learning Profile	0.877	0.915	0.88	0.917	0.924	0.940	0.803	0.797
Satisfaction	0.876	0.879	0.886	0.886	0.915	0.925	0.729	0.804

Table 2: Construct Reliability

The discriminate validity showed that the square root of AVE values was higher than the inner construct correlations, and all indicators loading were higher than their respective cross-loadings, as seen in

Table 3. After the application of a non-parametric bootstrapping the path coefficients can be seen through structural model assessments as shown in Table 4 & Table 5

	Attitude		Intention		Perceived ease of use		Perceived effectiveness		Perceived usefulness		Personal learning environment		Personal learning network		Satisfaction		Personal learning profile	
	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece
Attitude	0.898	0.921																
Intention	0.760	0.623	0.883	0.935														
Perceived ease of use	0.661	0.574	0.662	0.493	0.849	0.874												
Perceived effectiveness	0.664	0.707	0.624	0.625	0.577	0.506	0.874	0.811										
Perceived usefulness	0.641	0.774	0.645	0.745	0.704	0.513	0.758	0.754	0.851	0.925								
Personal learning environment	0.535	0.668	0.608	0.537	0.635	0.417	0.424	0.596	0.568	0.667	0.911	0.922						
Personal learning network	0.493	0.513	0.617	0.459	0.580	0.334	0.406	0.560	0.526	0.551	0.760	0.745	0.906	0.912				
Satisfaction	0.851	0.630	0.849	0.570	0.752	0.602	0.638	0.625	0.693	0.655	0.590	0.704	0.558	0.704	0.896	0.897	-	0.647
Personal learning profile	0.546	0.882	0.664	0.772	0.504	0.611	0.484	0.729	0.506	0.885	0.673	0.490	0.825	0.490	0.581	-	0.854	0.893

Table 3: Discriminate validity

In the sample from India, it was observed that perceived ease of use significantly affected both attitude and satisfaction as p-values are 0.03 and 0.00 < 0.05 at 95% significant level showing the support for H1a and H1b. But in the Greek sample, the perceived ease of use exhibited a significant effect only on

satisfaction as the p-value is 0.004 level but did not impact on attitude as p-value is 0.069 > 0.05 at 95% significant level showing support for H1b but not H1a. In the Indian sample perceived effectiveness (PE) and perceived usefulness (PU) did not impact user attitude and overall satisfaction as p-

values are 0.085, 0.279, 0.696, and 0.194 > 0.05 showing that H2a, H2b, H3a, and H3b are not supported. But in the Greek sample perceived effectiveness impacted only attitude but did not impact satisfaction as p-values are 0.019<0.05 and 0.182> 0.05. Additionally in the Greek sample, both attitude and satisfaction were impacted by perceived usefulness as p-values are both 0.000< 0.05 at 95% significant level (H2a supported, H2b not supported, H3a and H3b both supported).

Finally, in both Indian and Greek sample only satisfaction impacted behavioral intention for using e-learning as p-values are both 0.00 < 0.05 at 95% significant level (H4b supported), but both p-values for the impact of user attitude to behavioral intention for e-learning are respectively 0.307 and 0.780> 0.05 at 95% significant level. Consequently, H4a is not supported

Hypothesis		Original Sample (O)		pValues		Decision p <=0,05	
		India	Greece	India	Greece	India	Greece
H1a	Perceived Ease of Use -> Attitude	0.326	0.181	0.03	0.069	Accepted	Not Accepted
H1b	Perceived Ease of Use -> Satisfaction	0.448	0.189	0.000	0.004	Accepted	Accepted
H2a	Perceived Effectiveness -> Attitude	0.332	0.201	0.085	0.019	Not Accepted	Accepted
H2b	Perceived Effectiveness -> Satisfaction	0.165	0.123	0.279	0.182	Not Accepted	Not Accepted
H3a	Perceived Usefulness -> Attitude	0.054	0.388	0.696	0.000	Not Accepted	Accepted
H3b	Perceived Usefulness -> Satisfaction	0.144	0.610	0.194	0.000	Not Accepted	Accepted
H4a	Attitude -> Intention	0.139	-0.034	0.307	0.780	Not Accepted	Not Accepted
H4b	Satisfaction -> Intention	0.731	0.800	0.000	0.000	Accepted	Accepted

Table 4: Path coefficients for direct effects (H1a to H4 b)

Both India and Greece after testing the PLN the PEOU, PE, and PU did not exhibit any impact as their p-values were respectively 0.262, 0.47 and 0.568 > 0.05 at 95% significant level for the Indian sample and 0.101, 0.406 and 0.739 > 0.05 at 95% significant level for the Greek sample. Consequently, there was no support for H5a, H5b, and H5c in both countries. On the other hand, when testing the PLP for India, it exhibited an impact only on PE as the p-value was 0.032 < 0.05 showing the support for H6b but not for H6a and H6c. But for Greece, a full impact on all the three of them PEOU, PE, and PU as p-values were 0.000, 0.010, and 0.000 < 0.05 at 95 % significant level (H6a, H6b,

and H6c supported). Personal learning environment (PLE) impacted PEOU for the Indian learners (0.000 < 0.05 at 95 % significant level) but not for the Greek learners (as p-value was 0.322 >0.05 at 95 % significant level). Perceived usefulness was impacted in both samples (p-values were 0.003 and 0.000 <0.05 at 95% significant level respectively). But perceived effectiveness was not impacted in both India (as p-value was 0.125>0.005 at 95% significant level) and Greece (as p-value was 0.077>0.05 at 95% significant level). Hence it can be seen that H7a was supported for the Indian sample but not for the Greek, H7b were not supported and H7c was supported for both samples).

Hypothesis		Original Sample (O)		p Values		Decision p < 0.05	
		India	Greece	India	Greece	India	Greece
H5a	Personal learning network → Perceived ease of use	0.223	-0.239	0.262	0.101	Not Accepted	Not Accepted
H5b	Personal learning network → Perceived effectiveness	-0.149	0.103	0.470	0.406	Not Accepted	Not Accepted
H5c	Personal learning network → Perceived usefulness	0.096	-0.044	0.568	0.739	Not Accepted	Not Accepted
H6a	Personal learning profile → Perceived ease of use	0.011	0.688	0.953	0.000	Not Accepted	Accepted
H6b	Personal learning profile → Perceived effectiveness	0.467	0.370	0.032	0.010	Accepted	Accepted
H6c	Personal learning profile → Perceived usefulness	0.172	0.387	0.341	0.000	Not Accepted	Accepted
H7a	Personal learning environment → Perceived ease of use	0.459	0.119	0.000	0.322	Accepted	Not Accepted
H7b	Personal learning environment → Perceived effectiveness	0.223	0.263	0.125	0.077	Not Accepted	Not Accepted
H7c	Personal learning environment → Perceived usefulness	0.38	0.432	0.003	0.000	Accepted	Accepted

Table 5: Path coefficients for direct effects (H5a to H7c)

Mediation analysis was conducted through bootstrapping. Regarding Indian users, it was PEOU mediated between PLE and user attitude as well as PLE and overall satisfaction. Hence H7d and H7e were supported. On the other hand regarding the Greek users, it was seen that PU mediated between PLE and user attitude and PLE and overall satisfaction. Hence the H7d and the H7e of the Greek research were supported. As for the users

in India satisfaction also showed a mediation effect between PEOU and intention For the Greek user's satisfaction also showed a mediation effect between PEOU and intention and PU and Intention. The specific indirect effect for both India and Greece are shown in table 6 for those which are having p-values significant at 95 % sig level. As zero does not fall in the bias-corrected upper level and lower level bootstrapped confidence intervals, the indirect effect is proved as seen in table 6.

Hypothesis		p Values		Bias corrected CI 2.5%		Bias corrected CI 97.5%		Decision	
		India	Greece	India	Greece	India	Greece	India	Greece
H7d-G	Personal Learning Environment → Perceived usefulness → Attitude		0.011		0.062		0.512		supported
H7e-G	Personal Learning Environment → Perceived usefulness → Satisfaction		0.000		0.141		0.404		supported
	Personal Learning Environment → Perceived usefulness → Satisfaction → Intention		0.001		0.101		0.371		supported
H7d-I	Personal Learning Environment → Perceived ease of use → Attitude	0.037		0.028		0.317		supported	
H7e-I	Personal Learning Environment → Perceived ease of use → Satisfaction	0.003		0.089		0.367		supported	
	Personal Learning Environment → Perceived ease of use → Satisfaction → Intention	0.016		0.051		0.305		supported	
	Perceived ease of use → Satisfaction → Intention	0.001	0.000	0.157	0.334	0.520	0.644	supported	supported

Table 6: Path coefficients for specific indirect effects (H7d to 7e-mediation)

The research in India shows that the gender effect of PLE on PU differs across the two genders. The relation between Personal learning environment (PLE) and PU for females (0.621) was significant while the male (0.070) was not significant,

and the difference was 0.553 as shown in 7. The Greek research shows that the gender effect of PLE on PE differs across the two genders. The relation between personal learning environment (PLE) and PE for females (0.462) was significant

while the (-0.041) was not significant, and the difference was 0.503 as shown in Table 7. The gender effect of PLE on Perceived ease of use differs across the two genders. Personal learning environment (PLE) impacted males more than females concerning perceived ease of use as the path coefficient for males (0.418) was significant while the female path coefficient (-0.082) was not significant, and the difference was 0.500 as shown in 7. The gender effect of Attitude (A) on Intention (I) differs across the two genders. Attitude impacted males more than females concerning Intention as

the path coefficient for males (0.229) was significant while the female path coefficient (-0.216) was not significant, and the difference was 0.462 as shown in table 7. As seen in Table 8, for the Indian learners, attitude impacted behavioral intention for those who are working (0.518) while satisfaction impacted behavioral intention more in students (0.849). It was seen that PLP negatively impacted PEOU in working professionals (-0.541). As seen in Table 8, for the Greek learners, PU impacted attitude (A) more in students than in working professionals (0.542).

Path	Path coefficients male		Path coefficient female		Path Coefficients-diff (male vs female)		t-Value (male vs female)		p-Value (male vs female)	
	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece
Attitude -> Intention		0.229		-0.216		0.446		2.069		0.041
Personal Learning Environment -> Perceived Ease of Use		0.418		-0.082		0.500		2.148		0.034
Personal Learning Environment -> Perceived Effectiveness		-0.041		0.462		-0.503		2.129		0.036
Personal Learning Environment -> Perceived Usefulness	0.070		0.624		-0.553		2.32		0.022	

Table 7: Multigroup analysis for Gender

Path	Path Coefficients student		Path Coefficients working		Path Coefficients-diff (students vs working)		t-Value (Students vs working)		p-Value (working vs students)	
	India	Greece	India	Greece	India	Greece	India	Greece	India	Greece
Perceived Usefulness -> Attitude		0.542		0.049		-0.493		2.193		0.031
Attitude > Intention	0.053		0.518		-0.465		2.057		0.042	
Satisfaction > Intention	0.849		0.391		0.458		2.308		0.023	
Personal learning profile -> Perceived ease of use	0.185		-0.541		0.726		2.194		0.031	

Table 8: Multigroup analysis for Profession

DISCUSSION

In India, PEOU is affecting both attitude and satisfaction while in Greece PEOU is affecting only satisfaction. Hence PEOU is an important aspect to govern satisfaction among both the countries' learners. For Greece it is observed that PE is affecting attitude and PU is affecting both attitude and

satisfaction while in India both PE and PU have not come significant. This shows that Greek learners do give importance to the perceived effectiveness and perceived usefulness when learning through an e-learning platform. It is also seen that in both countries' satisfaction is the deciding factor for user intention for e-learning platforms. Hence TAM model can be validated across both countries and it is seen that variables of TAM are important

in deciding the overall use of technology. In India, PLP has come significant with PE but for Greece, PLP is significantly affecting PEOU, PE, and PU. Therefore, Greek learners believe more in personalizing their contents as per their profile and they feel that personalizing e-learning as per their profile will enhance their PEOU, PU, and PE of the e-learning course. This clearly emphasizes the creation of personalized learning content by understanding the user profile and his/her background concerning the area of interest and academic qualification. PLE is related to PEOU and PU for India and PU for Greece. This shows that a personalized learning environment is crucial for the learner for gaining the perceived usefulness of a system. If the learning environment is enjoyable and user-friendly it will make it more useful to the learner. Surprisingly in both countries, PLN did not contribute towards PEOU, PE, and PU.

When looking at the mediating effect it was seen that for India PEOU mediated the relation between PLE and user attitude and PLE and overall satisfaction. Satisfaction further mediated between PLE and intention to use. The Indian learner pays a lot of importance to ease of use of any system including e-learning and that decide their satisfaction level finally impacting their intentions. While in Greece PU is mediating between PLE and user attitude and overall satisfaction leading to more intention to learn from e-learning. Therefore, the usefulness of the system helps in creating a more personalized environment for the user leading to a higher satisfaction level. PEOU is mediating between PLP and satisfaction leading to intention. PU is mediating between PLP and attitude and satisfaction leading to intention to use. Both PEOU and PU increase the matching of personalized profiles leading to higher satisfaction.

The multigroup analysis for Greece also showed that PLE impacted both Perceived effectiveness and Perceived ease of use differently across gender. The user attitude is affecting user intention for learning through e-learning also differ across gender. Also, Perceived Usefulness impacted Attitude differently across two types of learners, i.e. students and working professionals.

a. Theoretical implications

The implication of the study is twofold first it validates the AI-enabled e-learning model across two countries and sees that the TAM model does hold good for both the countries and perceived ease of use is the common factor. Perceived usefulness and perceived effectiveness are other factors that are seen to be relevant in the Greece context. For India, only PEOU is significantly affecting the attitude and satisfaction level of users. India is a high power distance (PD) culture and learners would rely more on superior judgments and suggestions rather than trying a new technology themselves. India is also intermediate between collectivism and individualism and shows a mix of both cultural values. This culture is high on masculinity and learner would always use e-learning to showcase the achievement and desire to succeed. India is low on uncertainty avoidance and therefore individuals may try new technology without bothering about its effectiveness and usefulness till the time it's easy to use.

Greece culture has shown low power distance and all factors for TAM have come significant. This can be explained by Mccoy et al.(2005) study which showed that PD moderates the relation between PU and intention suggesting that they would be strongly related for culture with lower PD. This can be explained such that in low PD culture individuals are not affected by superior ideas regarding the use of technology and may use their judgment and intention looking at the

usefulness of the technology. As Greece is collectivist culture and it is seen that all aspects of TAM like PEOU, PE, and PU are related to attitude and satisfaction. These findings can be supported by the MCCoy et al.(2007) study which found a weak link between PEOU and BI for collectivist culture as people in the culture will follow group norms and take other views in taking up any new technology.

Greece has a medium level of masculine culture people perform the tasks which give them achievement and drive only to some level, but they also look for some level of femininity for a more enjoyable environment for learning. This is supported by Srite and Karahanna(2006) who suggested that the PEOU and BI will be strongly related for high feminine culture as they emphasize on pleasant work environment and focus on interpersonal relationships. Other studies have also confirmed this relationship (Srite,2006; Mccoy et al.,2007). Greece is very high on Uncertainty avoidance (UA)with a score of 100 and Mccoy et al.(2007) suggested the moderating role of PU and PEOU with BI in high UA culture. Sanchez-Francco et al.(2009) showed that UA moderates the relation between PEOU and PU and BI in the education sector as this aspect may decrease the uncertainty and therefore shows greater influence in high UA samples. This can be explained as when cultural values make people avoid uncertainty then any use of new technology can be achieved only if all three aspects of the TAM model namely PEOU, PE, and PU are achieved.

Both PLE and PLP have come out to be relevant for Greece and India showing that creating a personalized learning environment and matching the profile of the user is an important aspect of any e-learning platform irrespective of the fact that which country or culture you are targeting, so these factors are universal. India PEOU has shown mediating effect for PLE and user attitude and overall

satisfaction while in Greece PU mediates the link between PLE and user attitude and their overall satisfaction.

b. Managerial implication:

The study suggests that culture plays an important role in deciding if an individual will use technology and e-learning. A different aspect of TAM may differ across different cultures depending upon the level of PD, IN, MS and UA. The framework of Hofstede's cultural values may be useful to guide when building any e-learning model for any specific culture as this awareness may provide a better usage level among the users. When AI-enabled e-learning model was tested for two different cultures it was seen that the two aspects PLE and PLP were relevant for both the culture. This emphasizes the role of creating an enjoyable environment and personalizing the content and methodology of delivery as per the user profile is an essential component of designing any e-learning platform across the globe. Input from culture can help in building a much better 'Ambient Intelligence classroom' as suggested by Montebello (2019) as it will be more sensitive towards the cultural values of the users. AI-enabled assessment systems customized for understanding the progress and intelligent tutoring system (Cope& Kalantzi,2016; Nye,2015; VanLenh,2011) can be integrated with cultural information. Cultural intelligence is defined by Earley and Mosakowski. (2004) as a "seemingly natural ability to interpret someone's unfamiliar and ambiguous gestures the way that person's compatriots would". Blanchard et al. (2005) proposed culturally AWAre (CAWAS) which are based on cultural Intelligent agents(CIA) which can understand and adapt the culture-specific behavior of a learner.

Limitation and future scope

While the national culture in macro-phenomenon, adoption, and use of technology may be considered as an individual-level. Individual behavior cannot be predicted and measured by national measurements and it would not be advisable to generalize culture values across different individuals (McCoy et al.,2005; Udo et al.,2012; Alenezi et al.,2015). Therefore, it important to investigate the individual-level culture values rather than national culture as in the same culture individuals may have differences in cultural values and especially in the case of technology adoption.

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