

Jang, Moonkyoung; Aavakare, Milla; Kim, Seongcheol; Nikou, Shahrokh

Conference Paper

The effects of digital literacy and information literacy on the intention to use digital technologies for learning - A comparative study in Korea and Finland

ITS Online Event, 14-17 June 2020

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Jang, Moonkyoung; Aavakare, Milla; Kim, Seongcheol; Nikou, Shahrokh (2020) : The effects of digital literacy and information literacy on the intention to use digital technologies for learning - A comparative study in Korea and Finland, ITS Online Event, 14-17 June 2020, International Telecommunications Society (ITS), Calgary

This Version is available at:

<https://hdl.handle.net/10419/224858>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

The effects of digital literacy and information literacy on the intention to use digital technologies for learning —A comparative study in Korea and Finland

Moonkyoung Jang¹, Milla Aavakare², Seongcheol Kim³, Shahrokh Nikou⁴

Abstract

Digitalisation impacts in the higher education environment and specifically on using digital technologies for learning purposes has increasingly changed such activities. In an information-based society, where individuals are overloaded with the sheer amount of information and digital tools and devices, literacy skills of an individual play an important role in how activities are being executed. In this paper, we aim to investigate how information and digital literacy of university students impact their decisions to use digital technology for learning. As such, an extension of the UTAUT model is applied on a dataset comprising of 194 and 192 young Korean and Finnish people in their 20s and 30s. Structural Equation Modelling (SEM) results show distinct differences between young Korean and Finnish people in multiple path relationships. For example, while digital literacy has no direct impact on the intention to use technology for learning for Finnish people, this path is significant for the Korean people. Based on this, recommendations for prospect research in adopting the proposed model are outlined and theoretical and practical implications are discussed.

1. Introduction

Education and technology have become inseparable in our everyday lives. Information and communications technologies (ICT) are actively used for education, and the ICT-enabled market continues to grow. The size of so-called “Edu-tech” market is around 142 billion dollars globally and it will continue to rise to 342 billion dollars in 2025 (Holon IQ, 2019). Many researchers have been studying how to develop educational technologies and how to effectively use those technologies in education. However, there is not too many studies focusing on people’s abilities to use overall digital technology, i.e., digital literacy (Nikou et al., 2018; Ribble and Bailey, 2007) or to efficiently find the information they need, i.e., information literacy (Nikou et al., 2019). Digital literacy refers to the ability to use digital technology and when and how to use it (Ribble and Bailey, 2007). It is the ability to use information and communication skills for discovery, evaluation, creation, and communication, and it requires cognitive and technical skills (Association of College and Research Libraries, 2000). Information literacy is the ability to solve problems by using the right information sources and applying suitable technology to the information problems required for one’s works. It is the ability of individuals to know when they need information, to identify, evaluate, and use it efficiently (ACRL, 2000).

The purpose of this study is to examine the effects of digital literacy and information literacy on the intention to use digital technologies for learning. There are studies on the role or effect of digital literacy or information literacy in a specific country (Nikou et al., 2019), but there is a lack of international studies which compare digital literacy or information literacy of two or

¹ Assistant professor, Global IT Management, Linton School of Global Business, Hannam University

² Doctoral candidate, Faculty of Social Sciences, Business and Economics, Åbo Akademi University

³ Professor, School of Media and Communication, Korea University

⁴ Docent, Faculty of Social Sciences, Business and Economics, Åbo Akademi University

more different countries. This study aims to conduct an international comparative study by examining the effects of digital literacy and information literacy on the intention to use digital technologies for learning in Korea as well as Finland. The research questions guiding this research is summarized as follows.

- **RQ1:** *Are digital literacy and information literacy of Korean people and those of Finnish people different?*
- **RQ2:** *Is there an average difference in Korea and Finland in terms of the effects of digital literacy and information literacy on the intention to use digital technologies for learning?*

2. Literature review and Hypothesis Development

It has been argued that in an information-based society and in its complex information landscape, a broad form of literacy skills and competences are required (Bawden, 2001; Nikou et al., 2018). Such skills and competencies are not “add-ons” to traditional literacy, but rather part of a wider notion of literacy in an information-based society (Bawden, 2001). In particular, information and digital literacy skills enable individuals to make use of digital technologies more competently.

However, not only the literacy skills are important abilities for using the technology, other factors could be considered equally important to information literacy and digital literacy when it comes to intention to use technology. One of the widely used theoretical models which has been developed to examine intention to use is the Unified Theory of Acceptance and use of Technology (UTAUT) and its expansion UTAUT II (Venkatesh et al., 2012). In this model, performance expectancy, effort expectancy, habit and hedonic motivation are determinant of intention to use. As it seems relevant to our overall theoretical objective, we adopt this framework and propose our model. In addition to these four determinants, we incorporate digital literacy and information literacy as two additional constructs to examine the intention to use technology for learning purposes among Korean and Finnish university students.

2.1 Digital literacy

Digital literacy (hereinafter DL) refers to skills and abilities needed to use the available digital technology (tools, devices and software) in order to fulfil the information needs. Gilster (1997) introduced the concept of digital literacy as: “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers” (p. 1). This term which is used interchangeably with media literacy or computer literacy has been widely used among scholars in different contexts such as the adoption of technologies for personal, academic and professional use (Beetham and Sharpe, 2011, p. 1) and to understand the cognitive skills needed to understand and use information in multiple formats (Chan et al., 2017, p. 2). In the information-based society where individuals are overloaded with information, digital literacy skills could enhance the functional use of technology. In this paper, we argue the perceptions that university students have towards their digital literacy skills may directly impact their intentions to use digital technology for learning purposes. It may also impact their expectations towards, e.g., the effort they need to put in order to learn and use a new technology and whether the use of that particular technology would enhance their learning performances. As such, if they gain benefits by using a technology for learning, it may become a habit for them to use that particular technology and therefore gain enjoyment. Thus, we posit that:

H1: digital literacy has a significant effect on the intention to use technology for learning

H1a: digital literacy has a significant effect on the performance expectancy

H1b: digital literacy has a significant effect on the effort expectancy

H1c: digital literacy has a significant effect on the habit

H1d: digital literacy has a significant effect on the hedonic motivation

2.2 Information literacy

Information literacy (hereinafter IL) refers to set of skills and abilities to locate, find, evaluate, use and share information. Machin-Mastromatteo (2012) defined information literacy as the individual's ability to handle information in general. As with any instructional and learning technologies, teachers and students need to consider why they are using the tool in class and how it contributes to learning outcomes (Brooks, 2015). Brooks (2015) argued that in the higher education environment, the students with the use of digital technology and in particular tablets, will be exposed to a variety of information sources and creation tools placed side by side, in a visual network of applications, i.e., being able to open multiple websites and applications simultaneously to e.g., find an article for the class or find the course schedule (p. 31). The Society of College, National, and University Libraries (SCONUL) has identified seven pillars for IL and in one of them emphasis is on one's ability to recognise the information and data landscape of the research context as a foundation for analysing information sources (2011). This ability is particularly important for the university students as part of their college studies require such ability to evaluate the source of information. Bell and Secker (2014) argued that IL programmes enhance students at higher education in several ways. Moreover, it has been argued that the IL of students is affected by ICT experience, the possession of ICT devices, the quantity of ICT-supported university courses and personal confidence in various aspects of Internet use (Šorgo et al., 2017, p. 751). However, as Šorgo et al. (2017) many studies have attempted to assess the impact of digital technology to IL, but there is a scant research investigating how IL will impact students' intentions to use digital technology for learning purposes or it affects perceptions regarding performance and effort expectations. Still, it is not sufficiently studied how IL skills impact one's habitual behaviour towards using technology for learning. Thus, we posit:

H2: information literacy has a significant effect on the intention to use technology for learning

H2a: information literacy has a significant effect on the performance expectancy

H2b: information literacy has a significant effect on the effort expectancy

H2c: information literacy has a significant effect on the habit

H2d: information literacy has a significant effect on the hedonic motivation

2.3 Performance expectancy

According to Venkatesh et al. (2003) and Venkatesh et al. (2012), performance expectancy (hereinafter PE) is defined as "the degree to which an individual believes that the system helps to improve job performance". Moreover, it can be speculated that an individual will be more likely to use a new technology if she or he finds that the use of such technology will improve her or his performance. In the context of this research (the higher education environment) we argue that both Korean and the Finnish students will be more inclined to use technology for their learning purposes. In other words, PE presents Korean and Finnish university students' beliefs regarding whether the use of digital technology will enhance their learning performance.

Thus, we posit that:

H3: performance expectancy has a significant effect on the intention to use technology for learning

2.4 Effort expectancy

Effort expectancy (hereinafter EE) has been argued to be one the most significant predictors of intention to use technology. According to Venkatesh et al. (2012), EE is “the degree of ease associated with the use of the system”, some authors (e.g., Cimperman et al., 2016; Nikou, 2019) have compared the EE to perceived ease of use (PEOU) in Technology Acceptance Model (TAM). In this paper, we argue that the easier individuals find it to use a new technology, the intention will likely be higher to use a technology for learning purposes. We assume the EE will have a direct impact to the intention to use of digital technology for learning among Korean and Finnish students. In other words, EE presents Korean and Finnish university students’ beliefs regarding the ease of use of digital technology for learning. Thus, we posit that:

H4: effort expectancy has a significant effect on the intention to use technology for learning

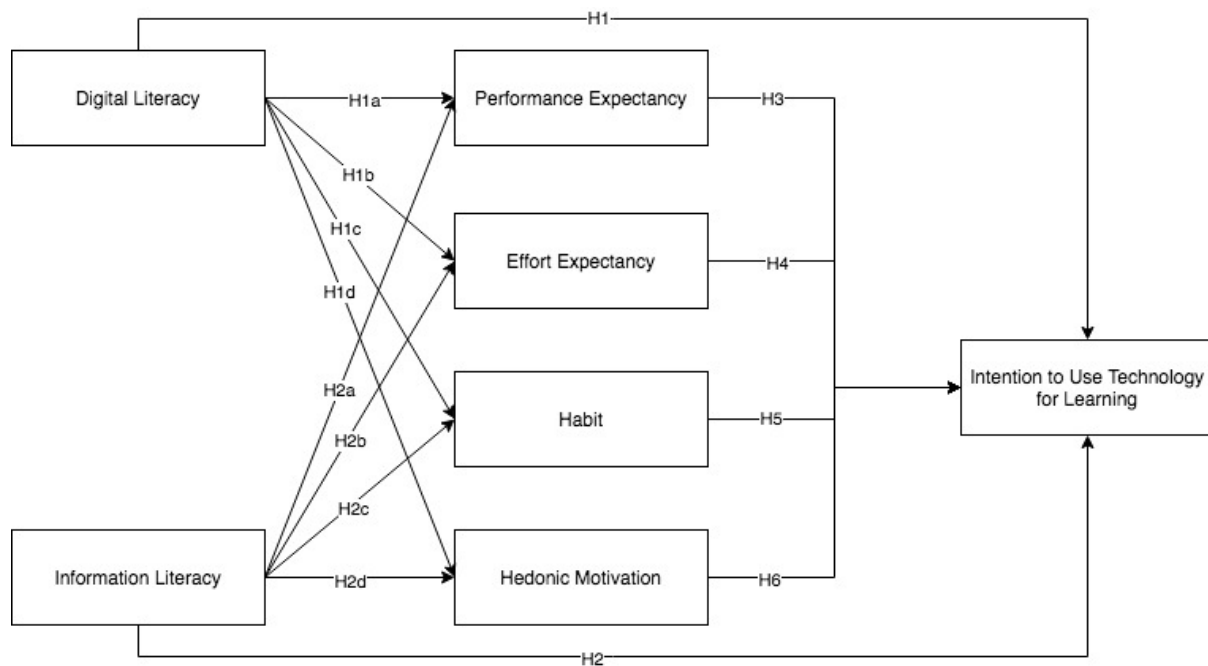


Figure 1. Conceptual model

2.5 Habit

Venkatesh et al. (2012) conceptualised the habit as having both direct and indirect effect to intention to use. Habit can be defined in two ways: (i) as a past behaviour (Kim and Malhotra, 2005) and that individual repeat the same behaviour, (ii) or as an individual’s believe that behaviour is automatic (Lamayem et al., 2007). In this research, we expect Korean and Finnish student’s past behaviours and habits in using digital tools and devices will increase their intention to use technology for their learning. Thus, we posit:

H5: habit has a significant effect on the intention to use technology for learning

2.5 Hedonic motivation

Brown and Venkatesh (2005) defined hedonic motivation as an enjoyment or happiness resultant from using a technology, which plays a significant part in determining new technology adoption. Raman and Don (2013) showed that hedonic motivation has a positive influence on the individual's behavioural intention to use learning management software. In this research, we expect the enjoyment and satisfaction that Korean and Finnish student's find in the use of digital tools and devices will increase their intention to use technology for their learning. Thus, we posit:

H6: hedonic motivation has a significant effect on the intention to use technology for learning

2.7 Intention to use

In the proposed conceptual model, the intention to use technology for learning is theorised as dependent variable. Based on the above theoretical discussions and the developed hypotheses, we expect that not only does digital literacy and information literacy directly impact Korean and Finnish students to use technology for learning, but also that the four UTUAT constructs directly impact the intentions. It is also expected that the four UTAUT constructs mediate the relationships between IL and DL to intention to use technology for learning. Our research model is presented in Figure 1.

3. Methodology

For our international comparative study, Korea and Finland were selected. These two countries are the leading ICT powerhouses in Asia and Europe respectively, and countries which survive in the global ICT ecosystem mainly led by the U.S. and China. In addition, both countries have the global ICT manufacturers such as Samsung Electronics and Nokia and also have promising tech-startups. For example, there global mobile apps such as Angry birds and Clash of Clans made in Finland, and Pinkfong and Lineage M made in Korea. Since Korea and Finland have the world-best ICT infrastructure, Internet usage and smartphone penetration are rated as the world's top. However, Korea and Finland seem to be different in their educational philosophies and systems even though both countries have very high interest and competitiveness in education. While Korea focuses on relative rankings in education, Finland is committed to equal and personalized education. Thus, it is meaningful to compare two countries which enjoy the same level of ICT development but have different educational environments.

In order to conduct a better comparison, our study focuses on young people in their 20s and 30s who debatably refers to be digital natives (Ng, 2012; Nikou et al., 2020). We conducted an online survey of young people in their 20s and 30s in Korea as well as Finland. Our survey items include basic demographic information and the average use of digital technology (e.g. average frequency of using hardware and software, level of proficiency of using software). Based on previous literature, we adopted survey items from validated sources to investigate the factors in our research model (i.e. digital literacy with 10 items (Ng, 2012), information literacy with 10 items (Ahmad et al., 2020; Kurbanoglu et al., 2006), performance expectancy with four items, effort expectancy with four items, habit with four items, hedonic motivation with three items, and intention to use digital technology for learning with six items all from (Venkatesh et al., 2012)). To test our research model, we adopted the PLS-SEM. In addition, to compare path coefficients of two countries, multigroup analysis (MGA) was conducted.

3.1 Data Collection

Two identical online survey questionnaires were used to collect data. For the young Finnish people, the data was collected between July-August 2019 and for the young Korean people, data was collected in December 2019. The participants were asked to provide their responses on three different sets of questions, where they first provided their background information regarding gender, age, and their highest education. In the second part of the questionnaire, respondents provided their answers regarding their access to digital technologies, frequency of use of technologies, and self-reported level of proficiency with digital technology. In the last section of the questionnaire, respondents provided their answers to statements on a 7-point Likert scale, ranged from 1 being “*strongly disagree*” to 7 being “*strongly agree*”. The respondents were invited through multiple channels, such as university noticed board, students mailing list, and authors social media networks. We obtained 192 usable responses from Finland and 194 responses from Korea.

4. Results

The basic statistics of the respondents are presented below. Then, we provide and explain the results on both the measurement model and the conceptual model followed by the hypothesis testing results.

4.1 Descriptive Analysis

The Finnish sample contained 116 (61%) males, 74 (39%) females, and two who identified as other. The Korean sample contained 53 (27.5%) males, 141 (72.5%) females. When addressing age, the respondents were within the age range of 20 to 39 and the average age of respondents was 28.63. When asked about the educational background, the majority of the sample stated that their highest level of education was a bachelor's degree $n = 246$ (64%), of those 88 were Finnish and 158 were Korean respondents. Information with respect to access to digital technology (Table 1), frequency of software use (Table 2) and self-report rating of proficiency with digital technology can be seen in Table 3.

As shown in the Table 1 below, the differences between Korean and Finnish respondents with respect to access to the digital technology can be seen in various digital tools. For example, access to tablets for the Korean respondents (mean = 2.64) is higher than the Finnish respondents (mean = 1.86), nevertheless the access to this digital device for both Korean and Finnish respondents is not very high. Moreover, while the access to PC is much higher for Korean group, for the Finnish group access to laptop is higher. We could not find any significant differences between the Korean and the Finnish in other digital tools and technology.

Table 1. Access to digital technology

Digital tools	Mean of Korean respondents (S.D.)	Mean of Finnish respondents (S.D.)	Mean difference
Mobile (smart) phone	4.974 (0.214)	4.952 (0.375)	0.022
Tablet	2.634 (1.621)	1.858 (1.241)	0.776***
Desktop computer (PC)	4.062 (1.467)	2.805 (1.607)	1.257***
Laptop computer	3.196 (1.571)	4.179 (1.054)	-0.983***
Game console	1.664 (1.141)	1.695 (0.955)	-0.031
Wearable device (e.g., smartwatch, fitbit)	1.711 (1.365)	1.674 (1.399)	0.037

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

As shown in the Table 2 below, there were some differences between Korean and Finnish respondents with respect to frequency of software use. These two groups are different in their frequency of use of, e.g., spreadsheets, whereas the use of this application is much higher for the Korean (mean = 3.90) compared to the Finnish group (mean = 2.84). So, it can be concluded that the frequency of software use among Korean and Finnish respondents is different.

Table 2. Frequency of software use

Digital tools	Mean of Korean respondents (S.D.)	Mean of Finnish respondents (S.D.)	Mean difference
Word processor (e.g., Word, Pages)	3.629 (1.453)	3.532 (1.042)	0.097
Spreadsheet (e.g., Excel, Numbers)	3.892 (1.441)	2.821 (1.168)	1.071***
Presentation (e.g., PowerPoint, Keynote)	2.918 (1.518)	2.384 (0.738)	0.534***
File sharing (e.g., Google Drive, Dropbox)	2.768 (1.444)	3.226 (1.087)	-0.458***
Photo/image editing (e.g., Photoshop, PhotoScape)	2.572 (1.413)	1.937 (0.990)	0.635***
Website management (e.g., WordPress, Squarespace)	1.706 (1.235)	1.484 (0.895)	0.222*
Mobile devices organiser (e.g., address book, calendar)	3.716 (1.342)	3.589 (1.243)	0.127
Email services (e.g., Outlook, Gmail)	4.242 (1.246)	4.689 (0.566)	-0.447***
Social media (e.g., Facebook, Instagram)	4.134 (1.408)	4.737 (0.662)	-0.603***

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

As shown in the Table 3 below, we could locate some differences between the Korean and the Finnish respondents with respect to their self-report proficiency with digital tools and technology. The observable difference was on their proficiency with, e.g., the MS Word processor and file sharing, where the Finnish respondents indicated higher proficiency than the Korean respondents. So, again it can be argued that the self-report proficiency with the use of digital tools and technology among Korean and Finnish respondents is different.

Table 3. Self-report rating of proficiency

Digital tools	Mean of Korean respondents (S.D.)	Mean of Finnish respondents (S.D.)	Mean difference
Word processor (e.g., Word, Pages)	4.644 (1.555)	5.842 (0.943)	-1.198***
Spreadsheet (e.g., Excel, Numbers)	4.603 (1.683)	4.384 (1.541)	0.219
Presentation (e.g., PowerPoint, Keynote)	4.510 (1.725)	5.174 (1.185)	-0.664***
File sharing (e.g., Google Drive, Dropbox)	4.206 (1.760)	5.505 (1.316)	-1.299***
Photo/image editing (e.g., Photoshop, PhotoScape)	3.732 (1.792)	3.221 (1.707)	0.511*
Website management (e.g., WordPress, Squarespace)	2.531 (1.810)	2.574 (1.740)	-0.043
Mobile devices organiser (e.g., address book, calendar)	5.284 (1.510)	5.537 (1.359)	-0.253
Email services (e.g., Outlook, Gmail)	5.526 (1.541)	6.147 (0.959)	-0.621***
Social media (e.g., Facebook, Instagram)	5.227 (1.827)	5.763 (1.265)	-0.536***

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

4.2 Survey Validation

We examined and assessed the proposed research model (a) at the measurement model and (b) at the structural model. Through the factor loadings, composite reliability (CR), and average variance extracted (AVE) the reliability and validity of the measurement model were assessed. The values of factor loadings, CR and AVE were all above the recommended threshold values of (.70, .70 and .50) respectively (see Table 4). However, due to some low factor loading, we removed few items (DL10, DL6, IL8 and INT 3) from the analysis.

Table 4. Construct reliability results

Construct	No. of items	Item loading	Cronbach's α	CR	AVE
Digital literacy	8	0.746-0.887	0.930	0.942	0.671
Effort expectancy	4	0.916-0.942	0.950	0.964	0.870
Habitual behaviour	4	0.691-0.902	0.838	0.886	0.663
Hedonic motivation	3	0.919-0.952	0.934	0.958	0.883
Information literacy	9	0.768-0.846	0.935	0.946	0.660

Intention to use	5	0.826-0.932	0.933	0.924	0.689
Performance expectancy	4	0.796-0.926	0.906	0.934	0.781

To establish discriminant validity, we used the square root of AVE for each latent variable (Fornell and Larcker, 1981). The obtained values were higher than other correlation values among the latent variables (see Table 5). Therefore, we could establish discriminant validity in our dataset.

Table 5. Discriminant validity [Fornell & Larcker]

Construct	DL	EFF	HAB	HED	IL	INT	PER
Digital literacy	0.819						
Effort expectancy	0.822	0.933					
Habitual behaviour	0.612	0.657	0.814				
Hedonic motivation	0.659	0.734	0.668	0.939			
Information literacy	0.771	0.732	0.576	0.612	0.812		
Intention to use	0.638	0.669	0.742	0.607	0.691	0.888	
Performance expectancy	0.650	0.697	0.688	0.674	0.668	0.769	0.884

Note: DL= Digital literacy; EFF= Effort expectancy; HAB = Habitual behaviour; HED = Hedonic motivation; IL = Information literacy; INT = Intention to use and PER = Performance expectancy

However, as we used PLS-SEM to perform analysis, we report the results of Heterotrait-Monotrait Ratio (HTMT) which is an alternative approach for establishing discriminant validity. All values were below recommended value of 0.85, see Table 6.

Table 6. Discriminant validity: Heterotrait-Monotrait Ratio [HTMT]

Construct	DL	EFF	HAB	HED	IL	INT	PER
Digital literacy							
Effort expectancy	0.834						
Habitual behaviour	0.651	0.690					
Hedonic motivation	0.703	0.777	0.726				
Information literacy	0.819	0.771	0.590	0.649			
Intention to use	0.678	0.711	0.763	0.649	0.731		
Performance expectancy	0.702	0.753	0.722	0.733	0.718	0.831	

Note: DL= Digital literacy; EFF= Effort expectancy; HAB = Habitual behaviour; HED = Hedonic motivation; IL = Information literacy; INT = Intention to use and PER = Performance expectancy

4.3 Hypothesis testing

To test our research hypotheses, we used the entire dataset which composed of 386 respondents (Korean; n = 194; and Finnish; n = 192). The SEM results show that the intention to use digital technology for learning was explained by a variance of 71%. The UTAUT constructs, performance expectancy, effort expectancy, habit and hedonic motivation were explained by a variance of 49%, 70%, 40% and 46%, respectively. Regarding the path analysis, the SEM results showed that digital literacy has no direct impact on the intention to use technology for learning, thus H1 was rejected. However, the SEM results showed that DL has a direct impact on all four UTAUT II constructs. The path relationship between DL to performance expectancy was significant ($\beta = .33$, $t = 4.794$, $p < .001$), thus H1a was supported. The path relationship between DL to effort expectancy was significant ($\beta = .64$, $t = 9.474$, $p < .001$), thus H1b was supported. The path relationship between DL to habit was significant ($\beta = .41$, $t = 6.215$, $p < .001$), thus H1c was supported. The path relationship between DL to hedonic motivation was significant ($\beta = .46$, $t = 6.625$, $p < .001$), thus H1d was supported.

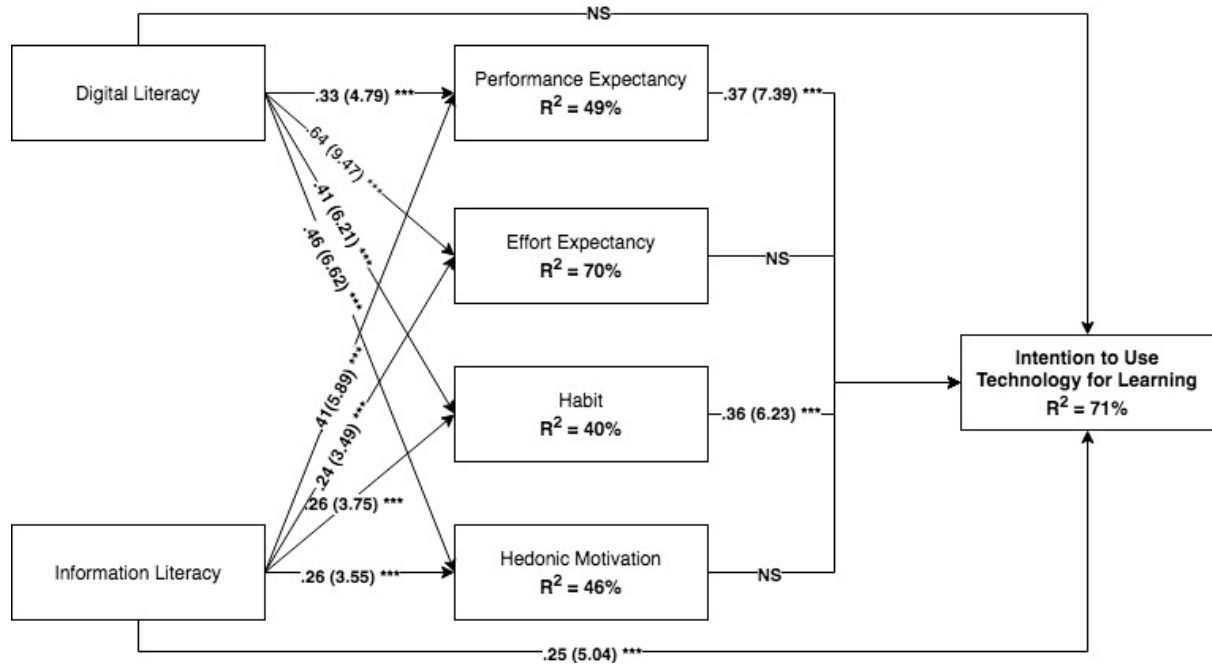


Figure 2. Structural model results

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$.

Moreover, the SEM results showed that information literacy (IL) has a direct impact ($\beta = .25$, $t = 5.044$, $p < .001$) on the intention to use technology for learning, thus H2 was supported. The SEM results showed that IL has a direct impact on all four UTAUT II constructs. The path relationship between IL to performance expectancy was significant ($\beta = .41$, $t = 5.934$, $p < .001$), thus H2a was supported. The path relationship between IL to effort expectancy was significant ($\beta = .24$, $t = 3.494$, $p < .001$), thus H2b was supported. The path relationship between IL to habit was significant ($\beta = .26$, $t = 3.753$, $p < .001$), thus H2c was supported. Finally, the path relationship between IL to hedonic motivation was significant ($\beta = .26$, $t = 3.554$, $p < .001$), thus H1d was supported.

Regarding the impact of the UTAUT constructs (performance expectancy, effort expectancy, habit and hedonic motivation) to intention to use, SEM analysis revealed interesting results. While, the impact of performance expectancy ($\beta = .37$, $t = 7.392$, $p < .001$), and habit ($\beta = .36$, $t = 6.226$, $p < .001$), to intention to use were significant; thus, supporting the H3 and H5. The path relationships between effort expectancy and hedonic motivation were not positively associated with the intention to use technology for learning; thus, both H4 and H6 were rejected.

4.4 Mediation effect

To examine whether the constructs of UTAUT: performance expectancy, effort expectancy, habit and hedonic motivation mediate the path relationships between digital literacy and information literacy to intention to use technology, we ran a mediation test. The results showed some interesting mediation effects, specifically regarding the path between digital literacy and intention to use. The result showed that the path between DL to intention to use was fully mediated through habit ($\beta = .15$, $t = 4.353$, $p < .001$) and performance expectancy ($\beta = .13$, $t = 3.957$, $p < .001$). Moreover, the path between IL to intention to use was also partially mediated

through habit ($\beta = .10, t = 3.233, p < .001$) and performance expectancy ($\beta = .15, t = 4.383, p < .001$). As per effort expectancy and hedonic motivation, we did not find any mediation effects.

4.5 Multigroup analysis (MGA)

This study is expected to find the differences, if any, between the Korean and the Finnish respondents. Therefore, we ran a multigroup analysis and divided the dataset into two groups. The intention was to examine if the impact of digital literacy and information literacy as well as the four constructs of UTAUT to intention to use technology for learning was different among Korean respondents and those of Finnish respondents. The MGA analysis revealed interesting results among these two groups across different path relationships. For example, the path between DL to intention to use was not significant for both groups, but the path between IL to intention to use was significant only for the Finnish respondents ($\beta = .26, t = 3.252, p < .001$).

Moreover, the MGA results showed no significant differences between the groups regarding the path between DL and the UTAUT constructs (performance expectancy, effort expectancy, habit and hedonic motivation). For both Korean and Finnish respondents, these path relationships were positively significant. However, the MGA analysis revealed different results when the path between the IL and the UTAUT constructs were examined. For example, information literacy was positively associated with all four UTAUT constructs for the Korean respondents, but none of these paths were significant for the Finnish respondents. This is a very important observation, as it shows the interplay between the literacy skills and the decision of individuals to use digital technology. It is rather surprising to see that information literacy skills of the Finnish respondents do not have any impact on the UTAUT constructs.

When the path relationships between the UTAUT constructs and the intention to use were assessed, the MGA revealed no significant differences between the Korean and the Finnish respondents. For example, the path between performance expectancy to intention to use as well as the path between habit to intention to use were positively associated for both groups. In the other two paths: (i) effort expectancy to intention to use and (ii) hedonic motivation to intention to use, the MGA results did not reveal any differences between the two groups.

Regarding the mediation effects of four UTAUT constructs between digital literacy to intention to use as well as between information literacy to intention to use, the MGA revealed many significant differences between the two groups. For example, while the path between IL to intention to use was mediated by habit for the Korean group ($\beta = .13, t = 2.293, p < .001$), this path was not significant for the Finnish group. Moreover, while the path between IL to intention to use was mediated by performance expectancy for the Korean group ($\beta = .22, t = 3.752, p < .001$), this path was not significant for the Finnish group. Finally, the path between DL to intention to use was mediated by performance expectancy for the Finnish group ($\beta = .14, t = 2.932, p < .001$), whereas this path was not significant for the Korean group.

5. Discussion

The core theoretical focus of this paper was to investigate the differences, if any, between digital literacy and information literacy of young Korean and Finnish people in their 20s and 30s. Our results showed that the effects of these two dimensions of literacy on the intention to

use digital technologies for learning are different between young people in Korea and Finland. In this paper, in addition to digital literacy and information literacy as two separate constructs, we incorporated our theoretical model with four constructs of UTAUT II (i.e., performance expectancy, effort expectancy, habit and hedonic motivation). Venkatesh et al. (2003) indicated that the UTAUT model explains approximately 70% of the variance in behavioural intention. In our paper, we could confirm this by showing that the intention to use digital technology for learning was explained by variance of 71%. Moreover, prior studies have demonstrated that there is a positive impact of effort expectancy (e.g., Wang and Shih, 2009) on intention to use technology for learning; however, Jaiarak et al. (2009) find no such effect. In this paper, it was found that EE positively impacts the intention to use technology for both Korean and Finnish people.

This paper theoretically contributes to literature by proposing an integrated theoretical model that includes DL, IL, and four UTAUT II constructs. This is one of the first studies that introduces such a conceptual model. Most prior studies, if not all, have either investigated the intention to use technology for learning via both UTAUT models, or studied the impact of DL and IL on the intention to use technology for learning. But, to the best of our knowledge, such combination (incorporating both DL and IL into UTAUT) has never been investigated. The results of such attempt showed that not only was the UTAUT model strongly validated by the obtained results in predicting young people's intention to use digital technology for learning, but it also showed that IL has only a direct positive impact on the Finnish people's intention to use technology. However, it should be noted that the SEM results and hypothesis testing outcomes provide a mixed support for our proposed model. Consistent with prior results, the analysis results showed that a significant impact on people's intention to use digital technology was not suggested by the effort expectancy (Salloum and Shaalan, 2018) and hedonic motivation.

Moreover, the results showed that although both young Korean and Finnish people are similar in many aspects, there are substantial differences when it comes to use of technology for learning. For example, Korean people reported an extensive use of PCs and tablets in their studies, whereas Finnish people reported an extensive use of laptops. Regarding the proficiency with the use of digital technologies and tools for learning, they are not substantially different.

We expect that the results of this paper will increase the understanding of digital literacy and information literacy for learning. The findings of this research suggest several implications for encouraging people to better use digital technology for learning. The practical implications of the results indicate that IL standards must be consciously and deliberately incorporated into the educational process. Higher education environments are heavily investing in digital tools, devices, and technologies for learning and teaching. So, if they aim to increase the use of digital technologies for learning and teaching purposes, they should define strategies that consider the needs towards programmes, instructions and training sessions that are developed to enhance and improve students' information and digital literacy skills.

Due to the context of this research (Korea and Finland), further research is needed in other countries to examine our proposed conceptual model. This can be done by including other people with different age ranges. In this research, we only included young people in their 20s and 30s. Moreover, we did not examine the difference between the young Korean and the Finnish people with respect to their demographic characteristics. However, this study raises some important questions that further studies can opt to investigate; for instance, does the

UTAUT model with information literacy and digital literacy fit well in other contexts than higher education environments?

Acknowledgements

This work, in Korea was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A3A2099973) and in Finland it was supported by the Academy of Finland project (grant number 295743). This work was also supported by Academy of Finland, project The Impact of Information Literacy in the Digital Workplace [grant number 295743].

References

- Ahmad, F., Widén, G., & Huvila, I. (2020). The impact of workplace information literacy on organizational innovation: An empirical study. *International Journal of Information Management*, 51, <https://doi.org/10.1016/j.ijinfomgt.2019.102041>.
- Association of College and Research Libraries. (2000). Information literacy competency standards for higher education. The Association of College and Research Libraries. American Library Association, Chicago, Illinois.
- Bawden, D. (2001). Information and digital literacies: a review of concepts. *Journal of Documentation*, 57 (2), p. 218-259.
- Beetham, H., & Sharpe, R. (2011). Digital literacies work- shop. Paper presented at the JISC learning literacies workshop, Birmingham [online]. Retrieved June 6, 2020 from <http://jiscdesignstudio>.
- Bell, M., & Secker, J. (2014). Transitions from school to higher education: Understanding the needs of undergraduates at LSE. In European conference on information literacy, 309–318. Springer International Publishing.
- Brown, S. A., & Venkatesh, V. (2005). Model of adoption of technology in the household: A baseline model test and extension incorporating household life cycle. *MIS Quarterly*, 29(4), 399-426.
- Brooks, A. W. (2015). Using connectivism to guide information literacy instruction with tablets. *Journal of Information Literacy*, 9(2), pp. 27-36.
- Chan, B. S., Churchill, D., & Chiu, T. K. (2017). Digital literacy learning in higher education through digital storytelling approach. *Journal of International Education Research (JIER)*, 13(1), 1–16.
- Cimperman, M., Brenčič, M. M., & Trkman, P. (2016). Analysing older users' home telehealth services acceptance behaviour—applying an Extended UTAUT model. *International journal of medical informatics*, 90, 22-31.
- Gilster, P. (1997). Digital literacy. New York: John Wiley.
- Holon IQ. (2019). 10 charts that explain the Global Education Technology Market. <https://www.holoniq.com/edtech/10-charts-that-explain-the-global-education-technology-market/>. Accessed 04 June 2020.
- Jairak, K., Praneetpolgrang, P., & Mekhabunchakij, K. (2009). An Acceptance of Mobile Learning for Higher Education Students in Thailand. *International Journal of the Computer, the Internet and Management*, 17(SP3), 36.1–36.8.
- Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying post-adoption phenomena. *Management Science*, 51(1), 741-755.
- Kurbanoglu, S.S., Akkoyunlu, B., & Umay, A. (2006). Developing the information literacy self-efficacy scale. *Journal of Documentation*, 62(6), 730-743.

- Lamayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intentions: The case of IS continuance. *MIS Quarterly*, 31(4), 705-737.
- Machin-Mastromatteo, J. D. (2012). Participatory action research in the age of social media: Literacies, affinity spaces and learning. *New Library World*, 113(11), 571-585.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & education*, 59(3), 1065-1078.
- Nikou, S. (2019). Factors driving the adoption of smart home technology: An empirical assessment. *Telematics and Informatics*, 45, 101283. <https://doi.org/10.1016/j.tele.2019.101283>.
- Nikou, S., Brännback, M., & Widén, G. (2018). The impact of multidimensionality of literacy on the use of digital technology: digital immigrants & digital natives. WIS 2018, Well-Being in the Information Society – Fighting Inequalities, August 27th-29th, Turku, Finland.
- Nikou, S., Brännback, M., & Widén, G. (2019). The Impact of Digitalization on Literacy: Digital Immigrants vs. Digital Natives. In the Proceedings of the 27th European Conference on Information Systems (ECIS 2019). June 10th-14th, 2019, Stockholm, Sweden.
- Nikou, S., Cavaleiro, S., & Widén, G. (2020). Digital Natives and Digital Immigrants in the Creative Economy. In International Conference on Information (pp. 343-362). Springer, Cham.
- Raman, A., & Don, Y. (2013). Preservice teachers' acceptance of learning management software: An application of the UTAUT2 model. *International Education Studies*, 6(7), 157-164.
- Ribble, M., & Bailey, G. (2007). The nine elements of digital citizenship International Society for Technology in Education. Digital Citizenship in schools, 13-37.
- Salloum, S. A., & Shaalan, K. (2018). Factors affecting students' acceptance of e-learning system in higher education using UTAUT and structural equation modelling approaches. In International Conference on Advanced Intelligent Systems and Informatics (pp. 469-480). Springer, Cham.
- Society of College, National, and University Libraries. (2011). The SCONUL Seven Pillars of Information Literacy. Available at: <http://www.sconul.ac.uk/sites/default/files/documents/coremodel.pdf>. Accessed: 06 June 2020.
- Šorgo, A., Bartol, T., Dolničar, D., & Boh Podgornik, B. (2017). Attributes of digital natives as predictors of information literacy in higher education. *British Journal of Educational Technology*, 48(3), 749-767.
- Wang, Y.S., & Shih, Y.W. (2009). Why Do People Use Information Kiosks? A Validation of the Unified Theory of Acceptance and Use of Technology. *Government Information Quarterly*, 26(1), 158-165.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3) p. 425-478.
- Venkatesh, V., Thong, J.Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157-178.