Examining Digital Attitudes by Using M-Learning Tool

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Abstract: With the rapid development of information technology and network infrastructure construction, the learning system has been changed from traditional face-to-face classroom to speedy information technology. On the past decades, educators have developed various scales to measure the learning attitudes. But few of them have constructed specifically for attitudes towards digital devices. The purpose of this study was to develop a digital attitude scale for elementary school teachers. The Digital Attitude Scale on this study was framed by four subscales: perceived usefulness, affection, perceived control, and behaviour. This study would also explore the relationship between digital device using experiences and teachers' response toward the scale. Research data gathered from Taiwan elementary school teachers revealed that teachers of various digital device using experiences did not show statistical differences on the perceptions toward the potential usefulness of the digital subscale.

Key-Words: mobile learning, digital attitude scale

1 Introduction

With the rapid development of information technology and network infrastructure construction, digital learning is used mostly on the network. Through the network, we can learn anytime and anywhere. This kind of learning convenience completely changes the traditional teaching model. In addition, speedy wired and wireless extensive construction of transmission network, improve the learning method into mobile learning. Even combine the ubiquitous computing to construct a ubiquitous learning environment where learners can highly interaction.

Although some researchers pointed out the days for mobile learning have yet to come [5]. It really works now. Mobile learning is an important learning milestone following e-learning. The term e-learning comprises computer-based learning, Web-based learning, virtual classrooms and digital collaboration. Such as the Internet, intranets, extranets, satellite broadcast, audio/video tape, etc. Mobile learning is a subset of e-learning, and it is the learning by means of mobile devices, that is, m-learning is a new stage of the progress of e-learning [3].

In the twenty-first century, citizen's attitudes toward using and learning the digital technology may determine the educational and economical development of a society. Students' digital attitudes may influence their future involvement in digital-related careers or activities. Digital attitudes are the attitude towards digital learning, it means individual's opinions and interest the degree about digital learning, and the desire of participate digital learning in the future. Assessing students' digital attitudes with validity and reliability is necessary for future digital-related research. However, most existing computer attitude scales are no longer as relevant to today's students who have grown up in a digital-saturated society. Therefore, the purpose of this study was to base on knowledge management (KM), develop the Digital Attitude Scale (DAS) by both revising a previous computer attitude scale and adding new items.

2 Backgrounds

2.1 Mobile Learning

As Capron [1] said, the Internet has been recognized as producing the 4th industrial revolution in human history. Education and training is the process by which the wisdom, knowledge and skills of one generation are passed on to the next. M-learning will be the product of next generation. Mobile technology has become

fairly ubiquitous in the last few years [2][7]. Following traditional online learning, m-learning is recently emerging in the field of education. In spite of m-learning is part of e-learning, compared with other computer mediated, mobile devices possess the high permeate rate and high popularity among the youth.

M-learning enables the extension of learning such that it weaves itself into people's work or activities, when and where they need it [4]. There are many different definitions of mobile learning. Some scholars consider m-learning is a new stage of the progress of e-learning [3]. But Wierzbicki pointed out [7]: Mobile telephony thus brings back a world that very much fits our anthropological structure, based on ubiquitous multimodal communication, and it can fit Dewey's idea, a community must always remain "a matter of face-to-face intercourse". So sometimes, m-learning is described as e-learning through mobile computational devices. Or definitions emphasize on the mobility of the learner, rather than the device. In this paper, we focus more on the first one.

3 Method

3.1 Develop tools for examine the digital knowledge management attitudes

To develop the Digital Attitude Scale (DAS), an item pool were collected, mainly by adapting items from Selwyn's [6] computer attitude scale and rewriting new items. Selwyn proposed the following four subscales for computer attitudes: affection, perceived usefulness, perceived control and behaviour, including a total of 21 items. The items developed in this study were mainly based upon these items, and this study changed the term "computers" in the scale items by "the digital devices." For example, the item "Computers make me feel uncomfortable" was reworded into" The digital devices makes me feel uncomfortable." Besides, the authors developed 11 additional items for the initial pool of items. These items were included after consulting with some experts in digital technology and technology education. Many of these new items were statements addressing the special features of digital. For example, the items like "The digital device enlarges my scope" and "The digital device helps me acquire relevant information I need" focused on the function of worldwide connections and information sharing provided by the digital device. As a result, the initial pool of items in the scale included a total of 36 items. These 36 items were then presented using a five-point Likert scale (from "strongly agree," "agree," " disappear" "disagree" to "strongly disagree") to a group of Taiwan elementary school students for item analysis.

3.2 Participants

About 645 Taiwan elementary school students were selected as the participants of this study using cluster sampling. The population of elementary school students in Taiwan was clustered country-wide. However, if a subject had never used the digital device, their data were excluded from further statistic analyses. This left 411 subjects in the final sample pool.

4 Results

4.1 The Effects of Using the Platform

It is found that the interaction between the platform and the subjects were intensive that the professional knowledge of the subjects developed continuously. Due to the support of the document base and the discussion board, the sharing on the website was still growing as the workload of the subjects increased. There were 482 records of knowledge acquirement on the platform in the first month, 526 records in the second month, and 742 records in the third month.

Table 1: the growth of the interaction on digital knowledge management on the platform

	Records on the platform
The first month	482
The second month	526
The third month	742
	1750

4.2 *t*-test analysis for effects of students' attitudes

4.2.1 Effects of students' attitudes towards practicing knowledge management

From Table 2, the mean of *t*-test is 3.9969, t=44.583, which reaches the standard of significance. ($p < .001$) It shows that the students have positive attitude towards the subjects' practicing knowledge management because the result is higher than the test value.

Table 2: *t*-test analysis of the effects on the students when the subjects practice digital knowledge management Attitude

	Mean	SD	*t*
Summary	3.9969	.4533	44.583***

Note: Test value=3 N=411 ***p < .001

4.2.2 Effects of students' attitudes towards practicing knowledge acquirement

From Table 3, the mean of *t*-test in G1 is 4.35, and *t*=32.423. In G2, the mean is 4.02, and *t*=29.751. In G3, the mean is 3.91, and *t*=23.936. In G4, the mean is 3.75, and *t*=24.254. In G5, the mean is 3.92, and *t*=24.047. In G6, the mean is 4.01, and *t*=22.135. In G7, the mean is 4.00, and *t*=21.145. In G8, the mean is 3.89, and *t*=21.145. The results reach the standard of significance. (p < .001) It shows that the students have positive attitude towards the subjects' practicing knowledge acquirement.

Table 3: *t*-test analysis of the effects on the students when the subjects practice digital knowledge acquirement

Item	Questions	Mean	SD	*t*
G1	The teacher would instruct me skills of searching related information on the digital device.	4.35	.84	32.423***
G2	The teacher would instruct me how to find related information of the subject properly.	4.02	.70	29.751***
G3	The teacher would instruct me in looking for the extracurricular information.	3.91	.77	23.936***
G4	The teacher would instruct me in downloading the related information of the subject.	3.75	.79	24.254***
G5	The teacher would instruct me in downloading the extracurricular information.	3.92	.77	24.047***
G6	The teacher would introduce some domestic websites which have related information of the subject.	4.01	.92	22.135***
G7	The teacher would introduce some domestic websites which have extracurricular information.	4.00	.81	25.198***
G8	The teacher has introduced related foreign information in the class.	3.89	.85	21.145***

Note: Test value=3 N=411 ***p < .001

4.2.3 Effects of students' attitude towards practicing knowledge sharing

From Table 4, the mean of *t*-test in S1 is 4.11, and *t*=29.307. In S2, the mean is 4.03, and *t*=25.840. In S3, the mean is 3.95, and *t*=22.551. In S4, the mean is 3.93, and *t*=22.322. In S5, the mean is 3.84, and *t*=19.653. In S6, the mean is 3.88, and *t*=18.738. In S7, the mean is 4.12, and *t*=27.820. In S8, the mean is 3.99, and *t*=27.921. In S9, the mean is 3.92, and *t*=21.769. In S10, the mean is 3.94 and *t*=19.630.The results reach the standard of significance. (P < .001) It shows that the students have positive attitude towards the subjects' practicing digital knowledge sharing.

Table 4: *t*-test analysis of the effects on the students when the subjects practice digital knowledge sharing

Item	Questions	Mean	SD	*t*
S1	The teacher often shares some related information of the subject he/she found in the class	4.11	.77	29.307***
S2	The teacher often shares supplementary documents of the subject in the class	4.03	.81	25.840***
S3	The teacher often shares what he/she has learned from reading the related information of the subject.	3.95	.85	22.551***
S4	The teacher often shares what he/she has learned from reading the supplementary documents of the subject.	3.93	.85	22.322***
S5	The teacher would discuss with me about the related information of the subject he/she has found	3.84	.87	19.653***
S6	The teacher would discuss with me about the supplementary documents of the subject he/she has found.	3.88	.96	18.738***
S7	The teacher would instruct me in sharing the supplementary documents I found with others during group discussion.	4.12	.82	27.820***
S8	The teacher would instruct me in sharing what I have learned from the supplementary documents with others during group discussion.	3.99	.72	27.921***
S9	The teacher often provides me the information he/she shared with other teachers.	3.92	.85	21.769***
S10	The teacher often shares what he/she learned from sharing with other teachers.	3.94	.97	19.630***

Note: Test value=3 N=411 ***p < .001

4.2.4 Effects of students' attitudes towards practicing knowledge application

From Table 5, the mean of *t*-test in A1 is 3.95, and *t*=22.659. In A2, the mean is 3.96, and *t*=23.033. In A3, the mean is 3.77, and *t*=16.167. In A4, the mean is 3.96, and *t*=20.264. In A5, the mean is 4.16, and *t*=28.401. In A6, the mean is 4.05, and *t*=24.958. In A7, the mean is 4.00, and *t*=25.544. In A8, the mean is 3.94, and *t*=2.294. In A9, the mean is 3.94, and *t*=22.297. In A10, the mean is 4.01 and *t*=25.042.The results reach the standard of significance. (p < .001) It shows that the students have positive attitude towards the subjects' practicing knowledge application.

Table 5: *t*-test analysis of the effects on the students when the subjects practice digital knowledge application

Item	Questions	Mean	SD	*t*
A1	The teacher would instruct me in dong assignment with the supplementary information obtained on the digital device.	3.95	.85	22.659***
A2	The teacher would instruct me in writing a leaning list with the related information obtained on the digital device.	3.96	.85	23.033***
A3	The teacher would instruct me in writing my diary with the information obtained on the digital device.	3.77	.97	16.167***
A4	The teacher would instruct me in making leaning files with the supplementary information obtained on the digital device.	3.96	.96	20.264***
A5	The teacher would use the information downloaded from the websites as the supplement of the subject.	4.16	.83	28.401***
A6	The teacher would design different learning activities with the information downloaded from the digital device.	4.05	.85	24.958***
A7	The teacher would use the information obtained from the digital device in the class.	4.00	.79	25.544***
A8	The teacher would instruct me in completing a research through group discussion with the supplementary information provided by the teacher.	3.94	.86	22.294***
A9	The teacher would instruct me in completing a research through group discussion with the supplementary information provided by the classmates.	3.94	.84	22.597***
A10	I am happy applying the downloaded information in my learning.	4.01	.82	25.042***

Note: Test value=3 N=411 ***p < .001

4.2.5 Effects of students' attitude towards practicing knowledge innovation

From Table 6, the mean of *t*-test in C1 is 4.25, and *t*=28.825. In C2, the mean is 4.17, and *t*=28.404. In C3, the mean is 3.91, and *t*=21.522. In C4, the mean is 3.87, and *t*=17.830. In C5, the mean is 3.73, and *t*=15.272. In C6, the mean is 4.07, and *t*=24.084. In C7, the mean is 4.06, and *t*=25.333. In C8, the mean is 4.21 and *t*=30.812.The results reach the standard of significance. (p < .001) It shows that the students have positive attitude towards the subjects' practicing knowledge innovation.

Table 6: *t*-test analysis of the effects on the students when the subjects practice digital knowledge innovation.

Item	Questions	Mean	SD	*t*
C1	The teacher would create new learning activities with the supplement in the class.	4.25	.88	28.825***
C2	The teacher would create interesting learning activities with our discussion results.	4.17	.84	28.404***
C3	The teacher would create my suitable learning activities using the information offered by my classmates.	3.91	.86	21.522***
C4	The teacher would provide a learning list for my parents and I to complete together.	3.87	.99	17.830***
C5	The teacher would provide activities for my parents and I to participate together.	3.73	.98	15.272***
C6	The teacher would give the lectures in different places, not only in the classroom.	4.07	.90	24.084***
C7	The teacher would look for teaching materials in the natural environment.	4.06	.85	25.333***
C8	The teacher would instruct me in completing innovative research using the resources of the natural environment in the community.	4.21	.80	30.812***

Note: Test value=3 N=411 ***p < .001

4.3 The relationship, effects, and path model of the subjects' practicing KM in the virtual community

There are three main hypotheses in this study. First, there is no significant relationship between the subjects' practicing knowledge acquirement, knowledge sharing, knowledge application, and knowledge innovation. Second, there is no significant effect on knowledge innovation when the subjects practiced knowledge acquirement, knowledge sharing, and knowledge application. Third, there is no path model of the subjects' knowledge acquirement, knowledge sharing, knowledge application, and knowledge innovation.

4.3.1 The relationship analysis of the subjects' practicing knowledge acquirement, knowledge sharing, knowledge application, and knowledge innovation.

The results are shown as Table 7.

Table 7: Summary of the relationship between digital knowledge acquirement, digital knowledge sharing, digital knowledge application, and digital knowledge innovation

	Digital Knowledge Acquirement	Digital Knowledge Sharing	Digital Knowledge Application	Digital Knowledge Innovation
Digital Knowledge Acquirement	1.000			
Digital Knowledge Sharing	.614***	1.000		
Digital Knowledge Application	.634***	.766***	1.000	
Digital Knowledge Innovation	.502***	.682***	.741***	1.000

Note: ***p < .001

According to Table 7, the results of the subjects' knowledge acquirement, knowledge sharing, knowledge application, and knowledge innovation all have positive effects and reach the standard of significance (p < .001). Therefore, the first hypothesis 'there is no significant relationship between the subjects' practicing knowledge acquirement, knowledge sharing, knowledge application, and knowledge innovation' is not supported. It indicates that there is significant relationship between them.

4.3.2 The analysis of the effects on knowledge innovation when the subjects practices knowledge sharing and knowledge application

According to the analysis results in Table 8, the variances of 58.1% and 55.0% indicate that there are effects on knowledge innovation when practicing knowledge sharing and knowledge application. Therefore, the second hypothesis is partly supported that there are significant effects on knowledge innovation when practicing knowledge sharing and knowledge application while there is not significance effect on that with knowledge acquirement.

Table 8: the regression analysis of the effects on knowledge innovation when the subjects practices digital knowledge sharing an digital knowledge application

	R	R2 cumulant	R2 increase	β	F
Digital Knowledge Application	7.41	.550	.550	.529	499.041***
Digital Knowledge Sharing	7.62	.581	.032	.277	283.163***

Note: ***p < .001

4.3.3 The path model of the subjects' practicing knowledge acquirement, knowledge sharing and knowledge application, and knowledge innovation.

According to Table 9, it is seen that the path coefficient in each part reaches the standard of significance, except the one between knowledge acquirement and knowledge innovation. It shows the results as below. Knowledge acquirement has no significant effect on knowledge innovation (β=-.006). Knowledge sharing has significant effects on knowledge innovation (β=.279). Knowledge application has significant effects on knowledge innovation (β=.532). Knowledge acquirement has significant effects on knowledge application (β=.263). Knowledge sharing has significant effects on knowledge application (β=.605). Knowledge acquirement has significant effects on knowledge sharing (β=.614).

Table 9: the analysis of the path model of the effects on the subjects' practicing knowledge acquirement, knowledge sharing and knowledge application, and knowledge innovation

Self variables	Dependent variables	F	β	*t*
Digital Knowledge acquirement	Digital Knowledge innovation	188.328***	-.006	-.138
Digital Knowledge sharing			.279	5.396***
Digital Knowledge application			.532	10.079***
Digital Knowledge acquirement	Digital Knowledge application	347.499***	.263	6.895***
Digital Knowledge sharing			.605	15.847***
Digital Knowledge acquirement	Digital Knowledge sharing	247.664***	.614	15.737***

Note: ***p < .001

According to the analysis above, the figure of the path of KM can be shown as Figure 1:

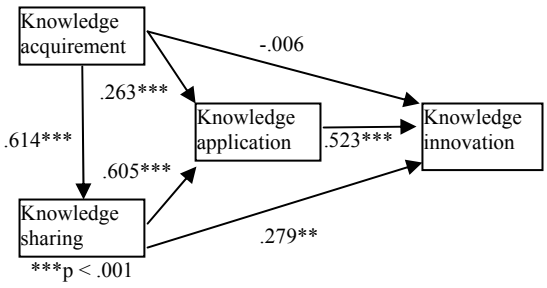

Fig. 1: The path of knowledge management

There are six significant paths:

- Knowledge sharing → Knowledge innovation
- Knowledge application →Knowledge innovation
- Knowledge acquirement →Knowledge application → Knowledge innovation
- Knowledge sharing → Knowledge application → Knowledge innovation
- Knowledge acquirement → Knowledge sharing → Knowledge innovation
- Knowledge acquirement →Knowledge sharing → Knowledge application → Knowledge innovation

The six paths analysis has direct influence on knowledge innovation that conforms to the views of some experts and scholars. Therefore, the third hypothesis is not supported that there are six significant paths on knowledge innovation when the subjects practicing knowledge acquirement, knowledge sharing, and knowledge application.

4.3.4 The effects on the subjects' practicing KM

The results are as below. In Table 10, the mean is 4.0061, and t=43.920. In Table 11, the mean is 3.9969, and t=44.583. In Table 12, the mean is 3.9740, and t=38.905. And in Table 13, the mean is 4.0353, and t=36.744. These all reach the standard of significance. From the questionnaire survey, it shows that the students have significantly positive attitude towards the effects on the subjects' practicing knowledge management.

Table 10: *t*-test of the effects on the students when the subjects practices digital knowledge acquirement

	Mean	SD	*t*
Summary	4.0061	.4644	43.920***

Note: Test value=3 N=411 ***p < .001

Table 11: *t*-test of the effects on the students when the subjects practices digital knowledge sharing

	Mean	SD	*t*
Summary	3.9723	.5563	35.435***

Note: Test value=3 N=411 ***p < .001

Table 12: *t*-test of the effects on the students when the subjects practices digital knowledge application

	Mean	SD	*t*
Summary	3.9740	.5075	38.905***

Note: Test value=3 N=411 ***p < .001

Table 13: *t*-test of the effects on the students when the subjects practices digital knowledge innovation

	Mean	SD	*t*
Summary	4.0353	.5712	36.744***

Note: Test value=3 N=411 ***p < .001

5 Conclusion

This study found that the operation function of practicing knowledge management needs deep and thorough interviews and consultation before selecting the subjects. Furthermore, communicating with members, creating a liberal atmosphere, integrating resources, and mastering the advantages of a professional leader to create a leaning environment on the digital device. Besides, it is seen that the students agree with the significance of the teachers' practicing knowledge management. The six paths show the significant effects on knowledge innovation from practicing knowledge acquirement, knowledge sharing, and knowledge application.

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