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Digital literacy skill education in assessment of learners for applied computer courses for learner skills development and development

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***Abstract*---**The pandemic COVID -19 causing the teaching style in higher education to change. This research aims to this study aims to investigate learners ' Digital Literacy (DL) knowledge in an applied computer course and how to improve assessment for learning (AfL). The sampling in research was 74 sample, student of studying Bachelor degree of Science in Food Technology. Mahidol University Kanchanauri Campus. Register course: Computer program applications. Statistics used for this research, frequency, mean, standard deviation, t-test, one-way ANOVA, two-way ANOVA and multiple regression analysis were used to analyse the data. Which was the general information such as gender, the Operating System (OS) Dependent Variable, which was DL level (Access, Analyse, Create and Evaluate). The result show that multiple regression analysis with squared multiple correlations (R^2) = 90.8%. It can be said that when the data of all 4 variables (creating, evaluating, analyse, accessing) were used to predict the learners ' learning level in relation to DL.

***Keywords*---**Education development, Digital literacy, Assessment for learning.

Introduction

The 21st Century (TeachThought, 2020) Outcomes and Support Systems model outlines a conceptual framework for 21st century capabilities. Information Age

Impacts and Support Systems help learners prepare for a variety of situations. Standards and assessments, curriculum and instruction, teacher development, an appropriate (Abraham, Ali, Andangsari, & Hartanti, 2020; Purnama, Ulfah, Machali, Wibowo, & Narmaditya, 2021; Sulaiman, Shorbagi, Abdalla et al., 2018; Westerlinck & Coucke, 2021)learning environment, and the development (C. Andersson & Palm, 2017; Cross, Morphet, & Miller, 2018; Elshami & Abdalla, 2017; Frey & Fisher, 2009; List, 2019; Mbanda, Dada, Bastable, Ingalill, & Ralf, 2021; Riel Miller, 2020) of a new age curriculum are examples. Education (Abdulai, Tiffere, Adam, & Kabanunye, 2021; Abraham, Ali, Andangsari et al., 2020; ALA, 2020; Alaidarous, Mohamed, Masuadi, Wali, & AlMalki, 2016; L. Andersson, 2019; U. B. Andersson, Löfgren, & Gustafson, 2019; Baek, Soares, da Rosa et al., 2021; Becton, 2018) for the twenty-first century is an education that will rapidly change the world, bringing with it challenges and problems, but also new opportunities and possibilities. The university of the twenty-first century will be a university with a project-based curriculum, a curriculum that allows learners to address real problems facing humanity and questions about the future of society. Universities will evolve from constructive to nerve centres that are not limited to the classroom and connect teachers, learners, and communities. Enter the treasure trove of knowledge around the world. Learning to build knowledge and create a culture of inquiry. In the 21st century, the theoretical training of Bloom's Taxonomy of learning will shift to focus on higher order learning skills. Specifically, the capacity to evaluate will be removed by the ability to apply relevant information in novel ways, as it was previously. Learners go to school to study various subjects and graduate. Today, however, there are new and different phenomena, such as teaching and learning, that help learners prepare for life in the real world. The emphasis is on lifelong learning with flexible teaching processes that are stimulating and motivating for learners to be a resourceful person who wants to continue learning after graduation. The 21st Century curriculum focuses on critical attributes related to interdisciplinary, project-based, and research-oriented work that connects local communities to sectors, countries, and the world. Collaboration with projects around the world. It is a course that focuses on advanced thinking skills. There is technology and multimedia to help with learning. The 21st century fundamentals are real-world assessments. Learners are classified as self-directed. They work both independently and collaboratively with others. Curriculum (Marcotte & Hintze, 2009; Polizzi, 2020; Su Yin, Haddawy, Suebnukarn et al., 2021) and instruction are challenging for all learners and accommodate individual differences. The course does not focus on anchoring. Textbook driven or fragmented as in the past. But it is a project-based course. Learners need to learn through research and practice on projects, learning from textbooks will only be a part of it. Knowledge is not memorizing facts or figures, but is the result of research and practice combined with existing knowledge and experience. The skills and content acquired are relevant and necessary for assessment to change from memorization and neglect of understanding of practice to assessment in which the assessed participates. Participate in self-assessment. Skills expected for the 21st century are learned through interdisciplinary, project-based courses, etc. Skills expected for the 21st century are learned through interdisciplinary, project-based courses, etc. Skills expected for the 21st century are learned through interdisciplinary, project-based courses, etc. Learning focuses on skills such as 1) learning and innovation skills; 2) life and professional skills information, media and technology

skills) expected through collaboration in teams, critical thinking, oral and written presentations.

As a result, education for the twenty-first century must shift from the traditional paradigm to the new paradigm. Learners are progressing toward the development of critical thinking abilities and attitudes. Problem-solving abilities, organizational abilities, a positive attitude, self-esteem, innovation, creativity, communication abilities, technological abilities and values, self-confidence, resilience, self-motivation, and environmental awareness Information, media, and technology literacy refers to the ability to deal effectively with knowledge in order to use it creatively, which includes: information knowledge, media knowledge, technology knowledge (Abdulai, Tiffere, Adam et al., 2021; Elshami & Abdalla, 2017; Herppich & Wittwer, 2018; Kay, 2010; Koh, 2008), life and professional skills, flexibility (Lewis, Hunt, Ramjan et al., 2020) and adaptability, creativity and self-confidence (Ross & Carney, 2017), social skills (Abdulai, Tiffere, Adam et al., 2021; Senye-Mir, Arumí-Prat, Pla-Campas, & Ramírez, 2016; Solheim, Plathe, & Eide, 2017), and intercultural society. Productivity and accountability (Yin & Buck, 2019), as well as leadership and accountability (Yin & Buck, 2019)

Assessment for Learning (AfL) (C. Andersson & Palm, 2017; U. B. Andersson, Löfgren, & Gustafson, 2019; Barana & Marchisio, 2016; Broadbent, Sharman, Panadero, & Fuller-Tyszkiewicz, 2021; Cross, Morphet, & Miller, 2018; Elshami & Abdalla, 2017; Fernando, 2018; Granberg, Palm, & Palmberg, 2021; Hughes, Salamonson, & Metcalfe, 2020) is an assessment approach to learning influenced by knowledge creation theory or constructivism. The assessment of the process and learning of learners by gathering empirical evidence based on the actual conditions of the learning process that takes place among learners in the field of learning to do, live including identifying and diagnosing learning problems and providing learners with qualitative feedback to improve their learning. using a variety of assessment methods to fully understand learners' learning in various aspects. Leading to adjustments in learning and teaching to be more effective, it is formative assessment that focuses on providing valuable information in three ways: information stimulation, feedback and provide information for further learning. Assessment that provides useful information to shape the teacher's instruction in more effective ways. AfL means that teachers also play a key role in assessment and positive communication. Inform learners of their strengths and weaknesses so they can improve and correct themselves.

Allow learners to evaluate their own and their peers' learning. Teachers should provide opportunities for learners to discuss and express their views on the grades assigned by the teacher. Learners help to define the criteria for assessing learning. Continuous feedback and guiding intellectual questions allow learners to assess themselves and look for ways to improve themselves by using various thinking processes. This also encourages learners to be self-learners for the rest of their lives. In Thailand's new era, education leading to learning has formulated policies that emphasize all aspects of human development. To respond to the fast and rapid changes in information technology. The use of technology to support teaching and learning management inside and outside the classroom to promote lifelong learning. In

addition, education in today's world has been developed according to the Thailand 4.0 policy to emphasize the development (Su Yin, Haddawy, Suebnukarn et al., 2021) of knowledge that is consistent with the development of technology in teaching and learning. To achieve learning that is consistent with the established policy. Therefore, teaching in the present has changed from the original format. Moving to online learning with an instructional management system and increasing efficiency. There is a mix of face-to-face and online instruction, with an emphasis on learning management processes that are aligned with the learner's learning context, consistent with an education that emphasizes lifelong learning. Everyone has unlimited access to learning at any time and in any place. The outbreak of COVID-19 (Abdulai, Tiffere, Adam et al., 2021; Purnama, Ulfah, Machali et al., 2021)has had a significant impact on the education system. The beginning of the spread of the virus in China late last year to the present, governments from 191 countries worldwide have been notified, according to UNESCO. Announcement of school closures across the country More than 1.5 billion learners are affected (more than 90 percent of all learners). In Thailand, the epidemic occurs during primary school vacations. In early April, the Cabinet approved the postponement of the first semester to July 1, 2020, to allow Thailand to review lessons from abroad to prepare a new teaching and learning approach consistent with measures to prevent the epidemic. Various measures are also being prepared to protect learners from the effects of changing learning styles. It also refers to teaching and learning where teachers and learners are spread across the environment and can easily communicate with each other.

Computer technology (Li, Brar, & Roihan, 2021; Molin, Haelermans, Cabus, & Groot, 2021; Su Yin, Haddawy, Suebnukarn et al., 2021)has to do with teaching and learning in three ways: 1) Learning about technology, that is, understanding how a computer works. until you are able to use the computer system. create an information system for remote communication. 2) Learning through technology, i.e., acquiring new knowledge and practicing specific skills and abilities through the use of technology media such as computer-assisted instruction and internet research. 3) Learning with technology, i.e., learning with communication systems through the use of technology, such as the use of programs that provide feedback problem-solving exercises with simulations, etc. Therefore, for communication to be complete enough to enable learning, communication tools must be used. Long distance communication can be achieved through the use of technology. The availability of information technologies for teaching needs to be in many areas, e.g. tools, network, programmes/platforms, content and teacher and student readiness. This study aims to investigate learners ' DL knowledge in an applied computer course and how to develop AfL in an applied computer course.

Review of related studies

The following skills are essential for the twenty-first century (Egan, Maguire, Christophers, & Rooney, 2017; Horoshko, Horoshko, Bilyuga, & Horoshko, 2021; Kay, 2010; Peña-Ayala, 2021; TeachThought, 2020) 1) Agility and flexibility, or the ability to deal with and solve difficult problems. They must be able to adapt to change, communicate effectively, take on a variety of roles, and understand

people. 2) Entrepreneurship and initiative. This is a test of the learners ' overall creativity and skills. Solve problems and perform a variety of tasks 3) Ability to communicate effectively orally and in writing Assessment of oral and written reporting characteristics 4) Information access and the ability to respond to feedback and write constructively Data collection and analysis Learning and innovation skills are more complex in the twenty-first century than they were in the twentieth century, when learners needed literacy and numeracy skills to prepare. Learner readiness 1) Critical creativity at work 2) Methods of brainstorming to generate new ideas and be innovative 3) Methods of creative communication 4) Ideas to help others accept and learn from failure 5) Methods of inductive and deductive reasoning 6) Analyse techniques and problem-solving strategies 7) Understanding evidence; good arguments and judges require evidence and arguments. 8) Collaboration with a variety of people; teamwork and leadership.

The ability to use digital technology to learn, work, entertain, communicate and participate in the creation and production of digital content is referred to as DL. Consequently, users must be able to analyses and evaluate digital content. Therefore, the aim of this article is to explain the development of DL, the importance of DL and the synthesis of the skills of DL in order to clearly understand the basics. The results show that the capabilities of DL consist of seven capabilities. As the following: (1) Accessibility (2) Analytical literacy (3) Evaluation skills (4) Creative skills (5) Communication skills. (6) Reflectivity (7) Action Competence. In this course there is a course learning outcome (CLO) corresponding to the DL for four skills. Which are Access, Analyze, Create, Evaluate.

Student-Centred Assessment (Curtis, 2011; de Oliveira, Marques Ciarelli, & Oliveira, 2013; Elshami & Abdalla, 2017; Faber, Luyten, & Visscher, 2017; Faber & Visscher, 2018; Fernando, 2020). DL refers to the ability to use today's tools, devices, and digital technologies such as computers, phones, tablets, computer programmes, and online media to promote communication, operation, and collaboration or to develop skills in the learning process. The ability to find, evaluate, and communicate information clearly through writing and other media on various digital platforms is referred to as DL. Grammar, composition, typing skills, and the ability to create text, images, audio, and designs using technology are assessed.

The goal of assessing learning is to improve learner learning as it occurs. Even though learning is ongoing, the primary goal of assessing learners is AfL. The gathering of information that has been meticulously planned and thought out in order to obtain information from the learner that is comprehensive enough to assist the learner understand what the learner has learned in terms of knowledge, skills, and abilities, including learning strengths and weaknesses, as well as the value of what has been learned and the learner's attitude toward learning.

Digital literacy (Abdulai, Tiffere, Adam et al., 2021; Abraham, Ali, Andangsari et al., 2020; Aydin, 2021; Baek, Soares, da Rosa et al., 2021; Beck, Goin, Ho, Parks, & Rowe, 2021; Becton, 2018; Çetin, 2021; Chen, Lin, & Chen, 2021) is the knowledge, understanding and ability to use electronic devices. In working with

information technology and information networks, it consists of 1) Accessing (Abdulai, Tiffere, Adam et al., 2021) digital technology tools effectively 2) Analyzing (Abdulai, Tiffere, Adam et al., 2021; Baek, Soares, da Rosa et al., 2021; Deja, Rak, & Bell, 2021; Moreno-Morilla, Guzmán-Simón, & García-Jiménez, 2021) the ability to analyze data, digital information media, 3) Creating (Cheng, 2021; Christiansen, 2021)content production creative Summarize and present digital information media. 4) Evaluate (Abdulai, Tiffere, Adam et al., 2021; Hughes, Salamonson, & Metcalfe, 2020; Ng, 2014; Polizzi, 2020) the assessment of digital information.

Access mean learners will be able to identify more than one source of information if they have access to it. Access information in a variety of ways by using various search engines (Search Engine). access to information systems data, for example. A diverse range of research databases, as well as appropriate selection. as well as access to the university's downloadable source of software packages to support education.

Analyzing means that learners can classify every type of information system in use today. Determine the type of computer program that corresponds to the task, such as a word processor. Presentation software, work schedule software, and mathematical and statistical software are all available. Compare information sources before deciding whether to use or cite them by distinguishing between facts and opinions expressed by the authors of the information. Determine the benefits and drawbacks of computer and mobile phone operating systems.

Create means that learners can generate content that is relevant to the situation. Use a variety of digital media tools to create media. Creating works from various ready-made programs that correspond to the work is one example. Analyze the results, then process the data to present the information. Evaluate, before using media or content presented on the internet, learners can evaluate its credibility. It also evaluates the credibility of websites for reference, such as private, government, or private websites. Assess the information's relevance to the issues of interest, as well as the value of the information that can be used as a reference.

Population and Sample

The sampling in research was 74 sample, student of studying Bachelor degree of Science in Food Technology. Mahidol University Kanchanauri Campus. Register course: Computer program applications. Data Collation, the tool used for data collection was a questionnaire which was divided into 3 parts as follows: section 1: General information about the respondents included gender and the OS using. Section 2: DL skill consist of access, analyze, create and evaluate and section 3: Open-End.

The variables used in the study were divided into 2 types: 1) Independent Variable, which was the general information such as gender, the OS used in the study, 2) Dependent Variable, which was DL level (Access, Analyse, Create and Evaluate)

Result

The course title is Computer Program Applications and the course description is Course Description. Basic computer applications; office programs such as document files, presentation files, and Excel files for calculating mathematical models; basic statistical analysis and software; and a presentation platform for mathematical and data statistical presentations. This course is designed to be completed over a 13-week period. You will be able to summarize the course evaluation process as follows: the Cronbach Alpha Coefficient of 4 variable and 16 No. of item consist of Access, Analyze, Create and Evaluate was equal = 0.920 following the expert assessment of the questionnaire's quality. The questionnaire will then be improved further based on expert recommendations. Before using this questionnaire in this research, it was tested with 30 non-sample groups and its reliability was calculated. The results of the trial will be used to improve the questionnaire's completeness and accuracy. require the most. A content validity test is used to investigate the reliability of a questionnaire by determining the test's confidence. The Cronbach Alpha method requires that the total set of questions be greater than 0.70 at the 95 percent confidence level.

From the information of the respondents presented in Table 1 presented 78.37 percent of the respondents are male while 21.622 percent are female. This result shows that this OS using presented in Table 1. In terms of the respondents, 43.24% are using IOS. Windows OS was 32.43% and Android OS was 24.32%, respectively.

The descriptive statistics are shown in Table 3. (minimum, maximum, mean, Std. deviation) of the learners ' satisfaction with the computer applications in the course. The results of the satisfaction level of DL show that the mean $\bar{x}$ = 3.507, S.D was .5908. The DL each sub-variable consists of Create ($\bar{x}$ = 3.540), Evaluate ($\bar{x}$= 3.537), Analyse ($\bar{x}$ = 3.473), Access ($\bar{x}$ = 3.479) Table 2 (T-test) shows that there are significant differences between genders in terms of DL, such as Satisfaction with Evaluating, Analyse, Access at 0.05 level of significance, the mean differences in job satisfaction between male and female. The data in table 3 shows that male have higher mean scores than women in the DL subscales of access, evaluation, analyse, and create. On the other hand, female have higher mean scores at DL in the Analyse, Access subscales. In terms of overall satisfaction, both male and female to be equally satisfied with their DL.

One-way analysis of variance (ANOVA) was conducted to determine whether differences in DL exist among the OS in this research. Table 4 indicates that the mean scores for window OS ($\bar{x}$= 3.702) and IOS ($\bar{x}$= 3.501) with respect to satisfaction with create, evaluation and access (at the .05 level of significance).

The research found that the interaction term (Gender*OS) is not statistically significant at an alpha level of 0.05 ($p < 0.113$) in the resulting two-way ANOVA interaction model (Table 5). This research separates the effects of two variables because the effect of one variable's level does not depend on the level of the other variable.

Table 6-7. shows the results of the Multiple Linear Regression test of the DL variables, which show that the equation for predicting the learner's learning level based on factors affecting DL level was Create, Evaluation, Analyse, Access. The analysis used a stepwise multiple regression analysis to show that access variable accounted for 34.0 percent of DL variance (R^2=0.34), analyse variable accounted for 25.4 percent of DL variance (R2=0.34), create variable describes 27.20 percent DL variation (R^2=.272), and evaluate variable describes 26.80 percent DL variation (R^2=.268).

Table 8. shows multiple regression analysis with squared multiple correlations (R^2) = 90.8%. It can be said that when the data of all 4 variables (creating, evaluating, analyse, accessing) were used to predict the learners ' learning level in relation to DL, the results in all four variables influence the DL level 90.8%, the rest may be due to other factors.

Table 1
Demographic profile of respondent

variable	Freq.	Cum. Freq.	Percentage	Cum. Percentage
Sex of Respondents				
Male	16	21.62	21.62%	21.62%
Female	58	78.37	78.37%	100.00%
Total	74			
OS using				
Windows OS	24	32.43	32.43%	32.43%
Android OS	28	24.32	24.32%	56.76%
IOS	32	43.24	43.24%	100.00%
Total	74			

Table 2
DL average (mean, stand deviation)

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Rank
Create	74	2.00	5.00	3.540	.62074	1
Evaluation	74	2.00	5.00	3.537	.67195	2
Analyze	74	2.25	5.00	3.473	.59617	3
Access	74	1.00	5.00	3.479	.79570	4
Average		2.13	5.00	3.507	.59084	-

Table 3
Differences in DL means based on Gender (N=74) (T-test) Gender

DL	Male	Female	t	p-value
Create	3.656	3.431	1.002	.320
Evaluation	3.828	3.375	2.816	.006*
Analyze	3.812	3.465	2.021	.047*
Access	3.875	3.444	2.340	0.22*
Overall DL	3.792	3.428		

* Denotes significant differences between groups at the 0.05 level

Table 4
Differences in DL means based on OS (N=74) (One-Way)

DL	Window OS	Android OS	IOS	p-value
Create	3.666	3.444	3.500	.049*
Evaluation	3.718	3.194	3.593	.047*
Analyze	3.677	3.222	3.460	.46
Access	3.750	3.166	3.453	.033*
Overall DL	3.702	3.250	3.510	

* Denotes significant differences between groups at the 0.05 level

Table 5
The two-way ANOVA with interaction term considers two factors

Source	Sum of Squares	Df	Mean square	F	p-value
Corrected Model	3.292	4	.823	2.602	.043*
Gender	.878	1	.878	2.775	.100
OS	1.073	2	.536	1.696	.191
Gender*OS	.817	1	.817	2.583	.113
Error	21.824	69	.316		
Total	939.098	74			

* Denotes significant differences between groups at the 0.05 level

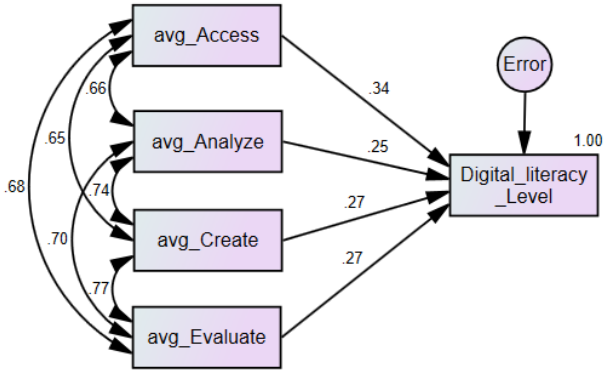

Figure 1 factor loading of variable

Table
6 DL (Multiple Linear Regression)

Estimate Digital_literacy	N	S.E	C.R.	df	P	Label
avg_Access	74	.251	.006	73	41.04	***
avg_Analyze	74	.250	.009	73	27.74	***
avg_Create	74	.257	.009	73	27.39	***
avg_Evaluate	74	.234	.008	73	27.60	***

* Denotes significant differences among groups at the 0.01 level

Table 7
Standardized Regression Weights

Dependent variable		Independent variable	Estimate
Digital_literacy	<---	avg_Access	.340
Digital_literacy	<---	avg_Analyze	.254
Digital_literacy	<---	avg_Create	.272
Digital_literacy	<---	avg_Evaluate	.268

Table 8
Squared Multiple Correlations

Source	Estimate R^2
Digital_literacy	.908

Table 9
Pre-test and post-test assessments (pair simple test) an applied computer course

(DL)	Pre-study ($\bar{x}$) *score*	Post-Study ($\bar{x}$) score
Pre-Post	3.671	4.262

The design of teaching and learning in an applied computer course, the results showed that the scores before learning and after learning, there were different average levels. The score after studying were higher than before.

Conclusion

Learning assessments for applied computer courses are created. Undergraduate learners ' abilities in DL knowledge, which consists of four areas of knowledge: access, analyze, create, and evaluate, can be improved through AfL. The advancement of online teaching methods has increased the efficiency of student learning. The findings also revealed that different genders influenced perceptions of DL in different ways. The devices are used on different operating systems, the creation and evaluation processes differ. The concluded that in order for learners to improve their DL level, teachers must encourage them to have knowledge and understanding of four variables, namely access, analyse, create, and evaluate, which influence prediction, (R^2 = .908). The development of the learning process, the online learning method found that the average student's grades have also increased with their studies.

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