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An investigation on the factors influencing teachers' use of ICT in assessment in the Northern mountainous region of Vietnam

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Abstract: *The research focuses on finding out which factors affect teachers' use of ICT in assessment in the Northern midland and mountainous region of Vietnam through a questionnaire. With 104 teachers participating in a survey from June 2022 to October 2022, it has been shown that there are many factors that affect teachers' decision to use or not to use ICT in the teaching and learning process. Besides, SPSS software was usedto process the survey results. It can be shown that when the teachers in the midland and mountainous region of Vietnam apply ICT in the assessment process, they are influenced by subjective factors in the assessment process, such as teacher's attitude andperception, or objective factors such as influence from colleagues, students, administrators and other control factors.*

Keywords: *ICT in assessment, technology in education, ICT-based assessment, ICT skill, Vietnam*

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I. Introduction

Introducing Information and Communication Technology (ICT) as a tool to support the education sector has initiated substantial discussions since the late 1990s. In the last years of the 20th century, the core issues were on Technical and Vocational Education and Training, and teacher training. During the last few years, an increasing number of international development agencies have embraced the potential of ICT for the education sector. In today's era, especially under the influence of the 4th industrial revolution and the covid 19 pandemic, the role of ICT is more important than ever.ICT has transformed work processes in organizations, has caused paradigm shifts in the education sector, and has changed student learning methods (Al-Rahmi et al., 2020)**.** The rapid development of ICT, particularly the Internet, is one of the most fascinating phenomena characterizing the Information Age. ICT powers our access to information, enables new forms of communication, and serves many on-line services in the spheres of commerce, culture, entertainment and education (Sarkar, n.d.).According to Bennett, Dawson, Bearman, Molloy, and Boud (Bennett et al., 2017), assessment is an important factor for student engagement, as it has a critical impact on both student learning and certification.Hence, the 21st century are continuously evolving demand people a lot of skills and competencies. Policies areresponding to these changes by focusing on the development of Key Competences for Lifelong Learning (Council, 2006). Therefore, it is essential to improve transversal and basic skills at all levels, especially entrepreneurial and IT skills.In order to foster these skills, assessment strategies should go beyond testing factual knowledge and capture the less tangible themes underlying all Key Competences. At the same time, assessment strategies need to be better harmonised with 21st century learning approaches by re-focusing on the importance of providing timely and meaningful feedback to both learners and teachers (Redecker & Johannessen, 2013).

However, learning processes and goals can only change if assessment also changes. Assessment is an essential component of learning and teaching, as it allows the quality of both teaching and learning to be judged and improved (Ferrari et al., 2009). Assessment procedures in formal education and training have traditionally focused on examining knowledge and facts through formal testing (Cachia et al., 2010) and do not easily lend themselves to grasping 'soft skills'. Lately, however, there has been a growing awareness that curricula — and with them assessment strategies — need to be revised to more adequately reflect the skills needed for life in the 21st century (Redecker & Johannessen, 2013). Using ICT in teaching could help change the assessment method to students and promote the skills needed in the 21st century.

In Vietnam, since 2001 the Ministry of Education and Training has issued Directive No. 29 on strengthening teaching, training and IT application in the education sector in the period 2001 – 2005 stating "ICT and multimedia will create great changes in the educational management system, in conveying program content to learners, promoting a revolution in teaching methods."(The Ministry of Education and Training, 2001). In 2006, Information Technology was introduced into the school curriculum as a compulsory subject at

high level. However, in the 2018 General Education Program, Informatics and Technology subject began to be taught in the program starting from grade 1 to grade 12, and the General Education Program also determines ICT competence for students from elementary to high school(The Ministry of Education and Training, 2018). Specially, the Government of Vietnam has program called "Waves and computers for me" with the aim of supporting students, especially students affected by Covid-19 epidemic so that they have conditions to study online effectively. The program prioritizes computer support and telecommunication services for students in difficult circumstances. The program helped many the poor students access technology devices to learn and improve their abilities to use ICT (Educational media center, 2021).

However, actually, the application of ICT in teaching still has differences among regions. In Vietnam, the Northern mountainous region hasdifficult natural condition than the others. In the northwest, it has high terrain and strong dissection and in the northeast, it has low mountainous terrain. The land in the region experienced numerously extreme climate events, such as prolonged drought, unusual colds, hail, frost, etc. They cause the deaths of animals, damage to crop systems, depletion of water resources, scarcity of food, and harmful impacts on health and household livelihoods.In addition, this is the residence area of many ethnic minorities such as Mong, Dao, Thai, Tay, Muong, etc (Vũ Tự Lập, 2006). Many residential areas in remote and isolated areas even lack running water and do not have electricity. With the current trend of digital revolution and innovation in general education in Vietnam, this will be a region that is heavily invested to deploy and strongly develop the application of ICT in many aspects, including education. However, in practice, there are still many factors affecting the use of ICT in teaching, especially the assessment process. The research focuses on finding out the subjective and objective factors affect teachers' use of ICT in assessment. Thereby, appropriate suggestions for educational policy makers can be proposed.

II. Material and Methods

2.1. Participants

The study involved a number of teachers who are teaching in the Northern mountainous area of Vietnam. The questionnaire was designed by google form and sent to 130 teachers from June 2022 to November 2022,but only 104 teachers responded. Among all the participants, three-fourths were female teachers and the other was male teachers. In short, the response rate was 80%.

2.2. Survey instrument: ICTA questionnaire

The ICT in assessment (ICTA) questionnaire was used as the main research instrument for this study. A questionnaire is to collect quantitative primary data. A questionnaire enables quantitative data to be collected in a standardized way so that the data are internally consistent and coherent for analysis. Questionnaires should always have a definite purpose that is related to the objectives of the research, and it needs to be obvious from the outset how the findings will be used(Awang, 2012). The ICTA survey was employed to generate quantitative data that was used to establish the basis for wider generalization and data was also used to analyze the factors that influence or hinder teachers' use of ICT in assessment. The main items in the questionnaire are shown in the following Table 1.

Table 1. Summary of main items in ICTA questionnaire

Variable	ICTA Questionnaire item
Teachers' opinions on ICT-based assessment	I feel that ICT-based assessment is inappropriate.
	I feel that ICT-based assessment is a good idea
	I feel that ICT-based assessment is appropriate.
	I like ICT-based assessment
	I feel comfortable whendoingICT-based assessment.
Human factors affecting teachers' ICT-based assessment	Office/Department of Education Experts
	Board of Directors/head of school
	Colleagues
	Parents
	Students
Important factors of teachers'ICT use in assessment	I definitely use ICT in assessment if I want to.
	I am fully capable of using ICT in a successful assessment
	I have the resources, knowledge and skills to do ICT-based assessment effectively.
	There are some things that I cannot control when using ICT in assessment.
	I can use ICT in assessment if I have a support person.
Frequency level of teacher's ICT-based assessment	Do not apply often
	Applied regularly in the last 6 months.
	Applied regularly in the last 1 month.
	Usually apply
Advantages of ICT-based assessment compared to traditional	Save time on assignment for students.

assessment	Get results fast and without grading.
	Easily store and export data.
	Quickly and accurately assess students' abilities and skills.
Teachers' difficulties in ICT-based assessment.	No computer
	No Internet
	I don't know how to use a computer.
	Students do not have technology devices for learning.
	The Board of Directors asks to limit the use of ICT in assessing students

2.3. Data analysis method

Data from ICTA questionnaire was analysedby SPSSwhich is the main statistical analysis approach in the research.For many years SPSS used to be considered as an acronym for "Statistical Package for Social Sciences" from 1968 by its initial developers, Norman Nie, Tex Hull, and Dale Bent (Hilbe, 2003). Muenchen determined the market shares of statistical software and concluded that IBM's SPSS Statistics program was the most preferred software in academic studies as of the end of 2018 (Muenchen, 2019).

III. Results

3.1. Teachers' opinions on ICT-based assessment

Table 2. Teachers' opinions about using ICT in assessment (N = 104)

Teachers' opinion	Minimum	Maximum	Mean	Std. Deviation
Inappropriate	1	5	2.62	1.168
Good	1	5	3.93	0.767
Appropriate	1	5	3.84	0.814
Interesting	1	5	3.77	0.884
Comfortable	1	5	3.77	0.884

With the use of a 5-point Likert scale from Level 1. Strongly disagree, Level 2. Disagree, Level 3. Unsure, Level 4. Agree and Level 5. Strongly agree to survey teachers' opinions about the use of ICT in testing and evaluating students. It can be seen from Table 1 that the Mean value has changed according to the teacher's opinion. The opinion "I feel that assessment using ICT is inappropriate" with a Mean of 2.62 shows that the level of agreement of the surveyed subjects is at an intermediate level (Unsure), and the giving of opinions among teachers about this opinion is also quite different with a standard deviation of 1,168. With other opinions such as feeling that assessing students using ICT is a good idea, or appropriate, interesting and comfortable, the Mean value expressed at a much higher level ranges from 3.77 to 3.93 i.e. the level of "Agree" at the same time. The standard deviation also fluctuates at a low level from 0.767 to 0.884, which shows that the responses of teachers participating in the survey do not differ too much. Through the above results, it can be seen that the majority of teachers agree with the inclusion of ICT in the assessmentof students.

3.2. Human factors affecting teachers' ICT-based assessment

Table 3. Human factors affecting teachers' ICT-based assessment (in percentages)

Influencing people	Not at all influential	Not influential	Unsure	Influential	Very influential	Mean
Office/Department of Education Experts	1.9	13.5	21.2	57.6	5.8	3.49
Board of Directors/Head of School	1.9	8.7	16.3	65.4	7.7	3.65
Colleagues	3.8	13.5	14.4	62.5	5.8	3.53
Parents	3.8	19.2	26.9	44.3	5.8	3.28
Students	2.9	7.7	12.5	63.4	13.5	3.77

The questionnaire shows 5 groups of people who have the ability to influence teachers' use of ICT in the assessment process. The results in Table 3 show 5 groups of people including experts from the office/ department of education, Board of Directors, colleagues, parents, and students. They have influence on the teachers' use of ICT in the assessment, but the degree is different. Specifically, the Mean value shows that the group of experts from the office/ department of education and the parents are the two groups with the least influence, while the Board of Directors (3.65), colleagues (3.53) and students. (3.77) are those who have the most influence on teachers in ICT-based assessment.

In addition, looking at the data table, it can be seen that level 4 (Influential) has a high percentage proportion compared to other levels (over 44%), in which the Board of Directors is considered a group of people with great influence. The highest was the use of ICT in the assessment of teachers (65.4%), followed by learners (63.4%), colleagues (62.5%), experts in the office/department of education (57.6%) and the lowest belonged to parents with 44.3%. With the selection at level 5 (Very influential), it shows that students are the group of people who have the most influence on teachers (13.5%), then the Board of Directors (7.7%) and the remaining 3 groups have the same influence rate at 5.8%. As for level 1, the experts of the office/department of education

and the Board of Directors where the teachers are directly working and teaching have the same "Not at all influential"proportion at 1.9%; for the group of influencers including colleagues, parents and students, the rate is higher from 2.9% to 3.8%. At the second level (Not influential), the highest proportion belongs to parents (19.2%) then second to the group of experts of the office/department of education and colleagues (same rate of 13.5%), the selection rate decreased gradually reduced to 8.7% for the Board of Directors and 7.7% for students.

3.3.Important factors of teachers' ICT use in assessment

Table 4 illustrates the mean and standard deviation on individual factors affecting teachers' use of ICT in teaching. Table 4 shows that the teachers agree that they can use ICT in the assessment process if they want to use it (mean = 3.88, s.d = 0.728) and agree that they can use ICT successfully in the assessment process (mean). = 3.83, s.d. = 0.703). Similarly, the majority of teachers interviewed agreed that they have the resources, knowledge and skills to use ICT effectively when doing the assessment (mean = 3.71, s.d. = 0.797). However, they are not sure that there are some things they cannot control when using ICT (mean = 3.42, s.d. = 0.921), and they also agree that they can assess using ICT with support (mean = 3.68), but the standard deviation is quite large (s.d. = 1.007).

Table 4. Important factors that enable the teachers to use ICT

Important factors	Minimum	Maximum	Mean	Std. Deviation
I definitely use ICT in the assessment if I want to.	1	5	3.88	0.728
I am fully capable of using ICT in a successful assessment	1	5	3.83	0.703
I have the resources, knowledge and skills to use ICT effectively in assessment.	1	5	3.71	0.797
There are some things that I cannot control when using ICT in assessment	1	5	3.42	0.921
I can use ICT in the assessment if I have a support person.	1	5	3.68	1.007

3.4.Frequency level of teacher's ICT-based assessment

With the issue of the level of use of IT in teachers' assessment process, there are also 5 levels offered for teachers. From Figure 1, it can be seen that the teacher chooses the highest level of agreement, and the lowest belongs to the level of completely disagree and completely agree. With the level of "frequent use", a total of 56.7% of teachers regularly use it, 21.2% of teachers are "unsure" with this choice and up to 22.1% (2.9% strongly disagree and 19.2%) disagree) teachers do not often use. With the frequency of regular use within the last 1 month, the same trend is also found with the choice of "agree" at 45.2% and "strongly agree" of 4.8% (total 50% of teachers who are interviewed regularly use IT in their assessment within 1 month). A total of 32.7% of teachers interviewed did not regularly use ICT in the assessment within 1 month.

With the problem of "regular use within 6 months", 56.7% of teachers "use" and "completely use" ICT in the assessment process. However, the uncertainty rate is also at the highest (26%) when compared with other levels of ICT use. With the remaining two levels of "Strongly disagree" and "disagree", the number of teachers selected is 17.3%.

"Not frequently used" is considered as the issue with the least choice of teachers at the level of agreement (0%) and 2.9% at the level of strongly agree. Up to 20.6% of teachers "disagree" with this issue and 7.7% of teachers chose "totally disagree".

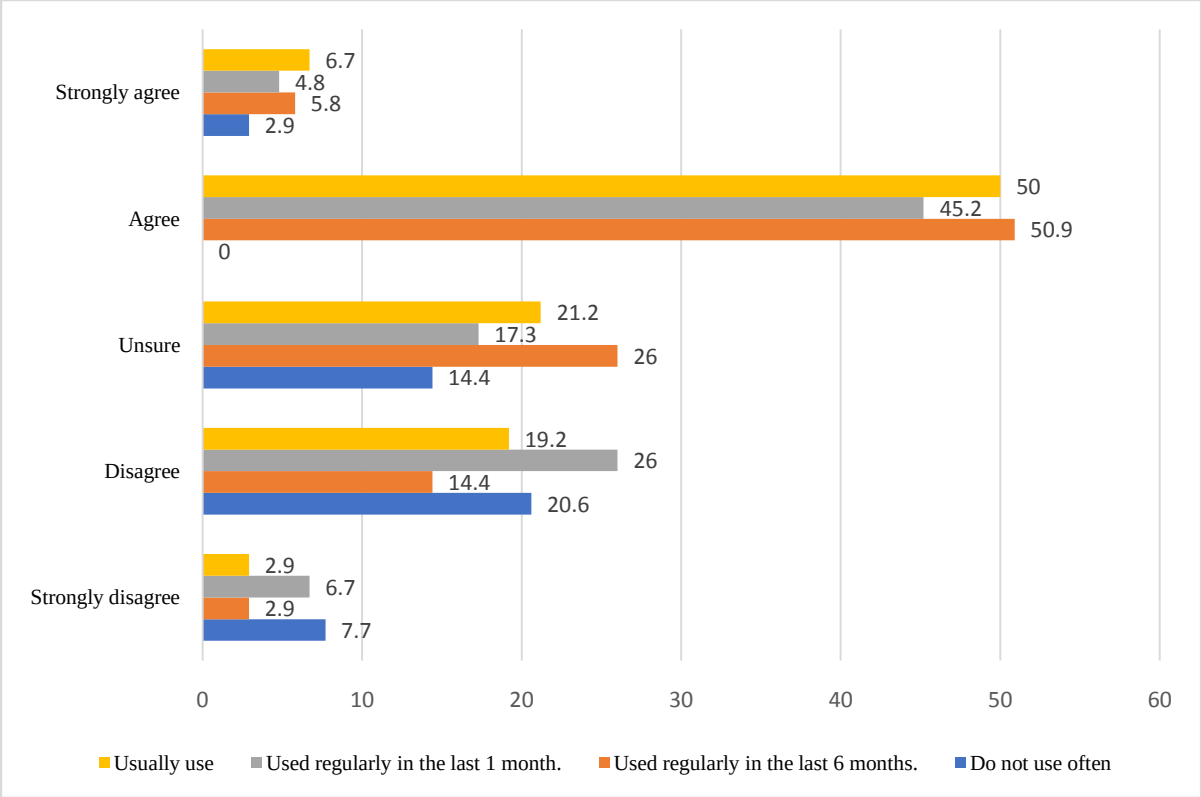

Figure 1. Frequency level of teacher's ICT-based assessment

3.5. Advantages of ICT-based assessment

Table 5. Advantages of ICT-based assessmentcompared to traditional assessment

Advantages of assessing by ICT	Minimum	Maximum	Mean	Std. Deviation
Save time on assignment for students.	1	5	3.97	0.717
Get results fast and without grading.	1	5	3.90	0.782
Easily store and export data.	1	5	4.06	0.694
Quickly and accurately assess students' abilities and skills.	1	5	3.88	0.720

Besides the factors from the teachers themselves, specific groups of people affecting the use of ICT in the assessment process, another important aspect that also affects the application of ICT in the assessment process is the benefits that ICT can bring to teachers. It is obvious that the advantages that ICT-based assessment brings far outweigh the traditional assessment (with only paper and pen). In which, the time saving when assigning lessons to students has a Mean value of 3.97, which means that the majority of teachers agree with this advantage. Or the use of ICT in the assessment which can help teachers quickly obtain the results of the students' work without marking by hand, especially to the multiple-choice tests, are also approved by the majority of teachers (Mean is 3.90). Besides, with the third advantage given in the survey content, which is easy to save and extract data, up to 86.5% of teachers chose level 4 (agree) and level 5 (strongly agree). And Mean value also represents the maximum value of 4.06 and the standard deviation is also at the smallest level (0.694) when compared with other values. With the last advantage given as being able to quickly and accurately assess students' skills and competences, the Mean value (3.88) also indicates that the majority of teachers choose the level of "agree" with alow level of standard deviation (0.720).

3.6. Teachers' difficulties inICT-based assessment

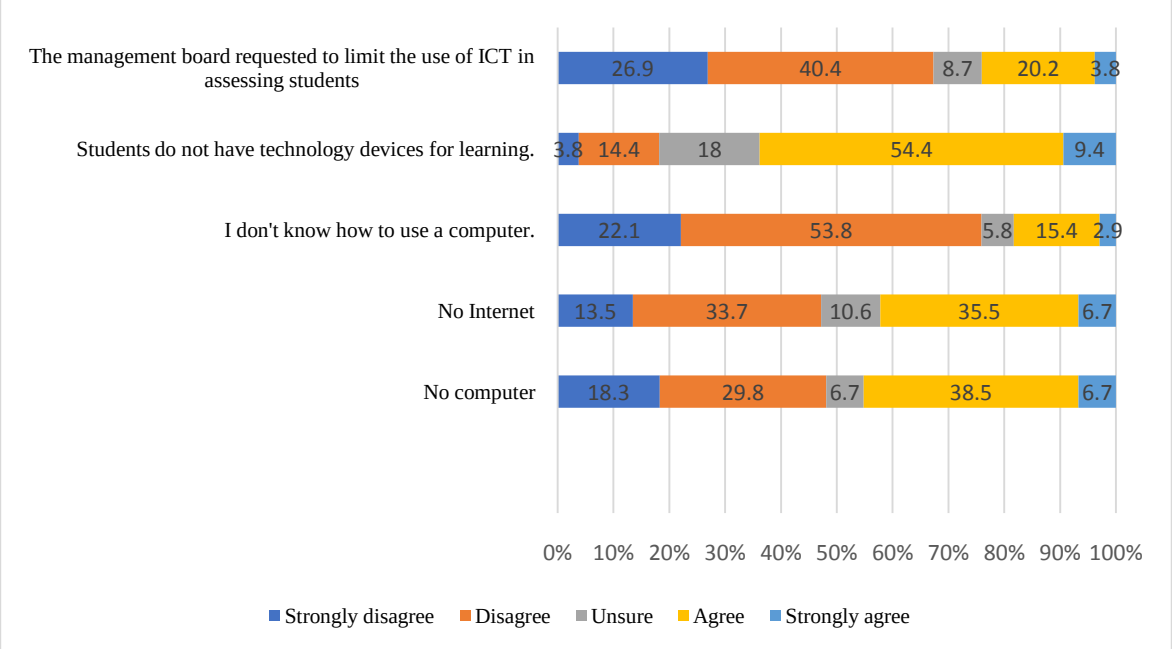

Figure 2. Teachers' difficulties in ICT-based assessment

Besides the factors that encourage teachers in ICT-based assessment, there are also factors that challenge this process. Specifically, with the choice of "Strongly disagree", up to 21.1% of teachers said that "do not know how to use computers" is not a difficulty preventing them from using ICT in the assessment and 26.9% of teachers also chose the level of "strongly disagree" when asked about the issue if the Board of Directors asked to limit the use of ICT in the assessment process. With other issues raised, the proportion selected is lower (from 3.8% to 18.3%).

At the second choice level (disagree), up to 53.8% of teachers think that the fact that teachers themselves do not know how to use computers is not a barrier for ICT use in the assessment process.The second rank at the second levelis 40.4% choosing that the issue of the Board of Directors request to limit the use of IT in the assessment process is not a difficulty preventing teachers from using ICT in the assessment. Less than 6.7% are teachers' choice when they think that the absence of the Internet is not a barrier in ICT-based assessment and 29.8% of the respondents also think that not having a computer is not a barrier for teachers. The choice at the lowest level 2 belongs to the problem "Students do not have technology devices to serve the learning process" (14.4%). With level 3 (unsure), the numbers fluctuate at a low level of less than 10%, except for the problem of not having an Internet network (10.6%) and students have no technology devices for the learning process (18%).

With the next selection, 54.4% of teachers "agree"" that students do not have technology equipment to serve the learning process, which is considered the biggest difficulty that makes teachers unable to use ICT in the assessment process. This time is also the most difficult choice at 5 (Strongly agree) with 9.4% of respondents choosing. Next, 38.5% of teachers chose "agree" when thinking that teachers' lack of computers is also a great difficulty and no Internet (35.5%) is the third reason why it is difficult to use ICT in the assessment of students. With the next difficulty mentioned, the Board of Directors askto limit the use of ICT in the process of assessing students and teachers themselves who do not know how to use computers, were agreed by less than 20.2% and 15.4%, respectively.

Thus, it can be seen that the problem that students do not have technology equipment, computers and the Internet are considered as the biggest difficulties for teachers in ICT-based assessment.

IV. Discussions

Through the above analysis results, it is not difficult to realize that there are many factors that affect teachers' decision to use ICT in the assessment process. According to Theory of Planned Behavior (Manstead & Parker, 1995), an individual's behavior is the result of a conscious selection process, governed by individual cognitive abilities and social pressures. This theory holds that individual behavior is governed by their plan of action in a particular situation, this plan will affect the person's attitude towards the situation, subjective norm (subjective norm) and how to control the situation.

Thus, the teachers' ICT-based assessment in the Northern Midlands and Mountains region of Vietnam is influenced by individual, social and controlling factors. Firstly, individual factors represent teachers' attitudes in a valid and reliable way through the survey on teachers' opinions on ICT-based assessment (Teachers express their likes, dislikes, and comforts or uncomforts). Second, social factors or subjective norms affecting teachers' use of ICT are often the principles and people who have a direct influence on teachers' use of ICT in the assessment. Finally, the controlling factors affecting teachers' use of ICT are their own capacity and resources, knowledge and skills to use ICT in the assessment process effectively and successfully. It is obvious that when teachers feel comfortable or feel that it is valid to use ICT in the assessment process, or there are people encouraging them to use ICT in the assessment process such as colleagues or students and feel that the level of success is high. The success of ICT-based assessment will help teachers be more motivated in using ICT in the teaching process in general and the assessment process in particular. From the above results, it will help educational administrators to have an insight understanding of the factors affecting the teachers' use of ICT in the assessment process, which will allow educational policy makers to make recommendations and policies incorporating ICT into the teaching process that are more reasonable and effective, especially in the northern mountainous areas of Vietnam.

V. Conclusions

Through the survey results, it can be seen that there are many factors affecting teachers in using ICT in the classroom assessment process. The active use of ICT in teaching in general and assessment in particular can help students to form their computer competence such as applying ICT in learning and self-study or cooperation in the digital environment. To do this, both teachers as well as education administrators need to recognize the factors that have a positive impact on teachers' ability to use ICT such as teachers' attitudes, pressure from management levels,or responsibility factor that is considered the key to help teachers successfully implement ICT-based assessment as well as help strategic planners come up with regulations and policies to support teachers in a timely manner so that they can sustainable use of ICT in teaching and assessment.

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