

## **Competencies On Implementations Of 21st Century Technology on Teaching, Learning and Assessment**

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### **Abstract**

There is a heated discussion on the implications of 21st century competencies on several aspects such as teacher readiness, curriculum and even assessment. According to Voogt & Roblin (2012), the development of professional teachers in the 21st century is an issue that arises in the discussion of several related frameworks. Agreeing with this statement is James (1994) who states that the 21st century requires change and thorough preparation of educational practitioners especially in institutions of higher learning such as colleges and universities. Several other researchers also agree with this statement such as Ruud (2002) that the changes that took place in the 21st era have very challenging implications for the mastery of efficient use of information and communication technology (ICT) especially in efforts to replace manpower to the use of machines. In this chapter, we will discuss how the efficiency of the 21st century has implications for several aspects in educational practice such as curriculum, the influence of ICT, professional development, communication and sector cooperation, assessment models, types of assessment and assessment instruments. This review paper explores the discussion related to the implications of 21st century competencies on teaching, learning and assessment through ICT. The findings of this study are expected to be a basic reference for future researchers.

**Keywords:** information and communication technology (ICT), 21st century competencies, teaching, learning and assessment

### **Introduction**

When we look at the challenges that arise from the rapid pace of technology in the 21st century, it turns out that big changes deserve to happen in the world of education. Pupils need to be equipped with new and current skills because of the influence of the needs of today's world. To begin this adaptation, the thing that needs to be emphasized is learning in school

because school is an institution where students build experience and knowledge formally. Looking at this situation, then the existing curriculum needs to go through a phase of change to enable it to be student -friendly and in line with the changes that are taking place in the world. In addition to the curriculum, teaching will also need to be changed so that it is not outdated.

According to Marion et al (2000), contemporary learning involves students who learn independently through felt experiences of their environment. According to them again, these students can no longer be influenced by traditional learning like previous practices because of the highly influential exposure through technology. As such, the existing curriculum is undergoing major changes where elements such as the influence of technology are formally incorporated. With the changes that take place in the curriculum, teaching will also automatically undergo changes.

Teachers and educational practitioners need to provide balanced citizens or students and not get caught up in things that could distort students 'behavior. Due to these factors, the 21st century has significant implications for curriculum and teaching. Alan (1998) stated that some features related to 21st century learning that need to be emphasized such as student -centered teaching, curriculum with the concept of national values. Whereas according to Cynthia et al (2000), 21st century teaching is more to the involvement of student -centered methods which requires students to explore on their own. According to Massimo et al (2014), an effective curriculum is very important in planning a 21st century learning environment with the concept of the latest technology and information.

## **Literature Review**

According to Massimo et al (2014) again, the 21st century has made the curriculum more local and global in nature that reflects the objective to make students competitive. Technically, significant changes have taken place in curriculum as well as learning as a result of 21st century competency implications. CSCNEPA (2008), in their paper have stated that 21st century curriculum is changing towards the purpose of providing an informative foundation and sharing perspectives. The paper also states that the 21st century curriculum encompasses economics, social and societal systems in developing the personal qualities and skills needed for them to become informed and responsible learners in an increasingly global society. This recommendation is also agreed by Acara (2015) who states that the 21st century curriculum has implications towards equipping young people with the knowledge, understanding, skills and ability to take opportunities and face future challenges with confidence. Similarly, PISC (2015) stated that the curriculum and teaching approach in the 21st century has changed and is more conceptualized to apply local subjects with an international approach. The most obvious implication is that the curriculum is changing to provide students who are more prepared and globally competitive while teaching has implications towards student -centered and technology -assisted learning.

The next implication is the very strong influence of ICT in learning practice in the 21st century. Roughly speaking we ourselves can see how the influence of the use of gadgets and digital materials in teaching inside and outside the classroom. Most researchers related to learning and competence in the 21st century admit the same thing that is related to the very rapid influence of ICT. According to Mark (1991), the use of technology has already begun in daily life as well as the learning process in schools. Similarly, as noted by Patricia (2003), that students learn in a world of technology that challenges the abilities of teachers in the 21st

century. Richard (2007) in his study stated that almost all organizations need employees who are efficient in using technology in preparation for the challenges of the 21st century. Inevitably, we cannot deny the continuity between the 21st century with ICT literacy competence. The use of ICT involving gadgets and computing is used very widely either in teaching in schools. This can be seen through the government's approach that emphasizes the initiative of providing laptops to every student in the school. The efficiency of computer and ICT literacy is one of the obvious implications in the 21st century. The obvious implications are the various forms of assignments and also the emphasis on something based more on ICT literacy.

Professional development for those involved in 21st century learning is one of the implications of 21st century competence where many studies and programs are implemented to adapt to the challenges of this century. This professional development always needs to be carried out because changes often occur in the needs of education today. According to PICS (2015), the need for professional development among educators in the 21st century is very necessary due to global educational competition, international innovation and also pressure in the workplace.

The development and preparation of teachers for the challenges of the 21st century is very important. Various agencies have run development programs for their professionals including educators. This is an implication to 21st century efficiency that we should acknowledge. As suggested by Andreas (2012) in his study i.e., effective leader development, 21st century teacher development, needs and readiness development. This statement is agreed upon by Philips (2015), that professional development should include both subjects, content and general pedagogical strategies focused on motivation, collision, and creative assessment strategies.

Professional development for teachers in particular exists as a result of the implications of 21st century competencies as teachers are in a dilemma to figure out how students learn today. According to Linda (2006), teachers need to understand how students learn and the nature of student diversity in more detail. While Mark (2009) stated that, the challenges of this century have urged teachers to meet some competencies and it is also a responsibility for teachers to develop their professionalism. The need for professional development is very important because it involves the needs of students and current pressures. According to Leanna et al (2010), professional development is important for the purpose of providing a model to keep up with rapid changes in technology, and to promote pedagogical transformation. So overall, 21st century learning competencies have great implications for professional development. We can see the implications of this professional development that is how teachers and professionals are given courses related to the use of digital materials and software in the teaching and learning process as well as preparation towards forming a balanced student policy.

The implications of 21st century competencies next are on collaboration between the public and private sectors in creating an effective workforce and current technology sharing. According to James & Evelyn (2012,12), public — private collaboration generally falls into several broad categories of activities: 1) sharing expertise; 2) exchanging information; and 3) executing projects and operations. With the rapid development of technology and great pressure on employee productivity, there is a need for cooperation between these two sectors. In this fast -moving world, students also need careful preparation before they can complete their studies at any level. Great competition is taking place where every year the products produced by the school or university hit the market or more affectionately called the industry.

This situation allows for close cooperation between the private sector as well as the public sector. These sectors cannot move effectively without cooperation. They can complement each other with knowledge sharing as well as job placement so that students as well as teachers can be prepared and complete with the latest knowledge. This is the implication that occurs when there is a need for competence of the 21st century. The existence of close and significant cooperation between sectors in the development of students and teachers. According to Tanja & Thomas (2005) in their study related to public-private cooperation, found that the importance of this cooperation in problem solving and also produce quality products or goods.

The need for collaboration between these sectors is acknowledged by various researchers across various fields. Among them is through the PPLF forum (2015), which states that such cooperation can enrich technology, knowledge and social networks between countries because at this time we face various challenges and are also provided with various unique opportunities. The implementation of cooperation between these sectors has also cost a lot of money by a country in an effort to succeed. According to GAVI (2015), in the United States, for example, the government spends almost 30 billion dollars for this purpose which aims to encourage technology exchange which in turn benefits society.

## Discussion

21st century competencies play a large role that has implications for the assessments conducted in schools. Various forms of change occur so that new models exist in evaluation. This is due to changes in various aspects of the teaching and learning process such as curriculum justification, pedagogical methods, ICT literacy and so on (Abdul Jalil et al., 2021; Mohd Noh et al., 2021; Mustafa et al., 2021; Roszi; et al., 2021; Tumisah et al., 2021). These changes have also given birth to new methods for assessing students' abilities. PFCS (2007), states that student assessment in this century is more focused on problem solving skills, critical thinking and process skills which are not available in traditional assessment which focuses on cognitive assessment only.

In this regard, PFCS (2007), proposed several relevant models and forms of assessment such as emphasis on formative and summative assessment which in their opinion is fair and comprehensive (Irma et al., 2021; Suzana et al., 2021; Rohanida; et al., 2021; Nazrah et al., 2021; Shahrulliza et al., 2021). Because students have been able to master various competencies in the 21st century especially ICT literacy, social skills, etc., then a comprehensive assessment needs to be done so that it is more significant (Mohd Arafat et al., 2021; Sumaiyah et al., 2021; Hifzan et al., 2021; Shahrul et al., 2021; Helme et al., 2021). Darling-Hammond et al (2010) stated that performance appraisal is relevant to the current situation because it requires students to go through a process in completing assignments, think critically and encourage students to argue against a given answer.

The need for new models and methods in assessment is a clear implication in the teaching and learning process in the 21st century (Farah et al., 2021; Syahrul et al., 2021; Quah et al., 2021; Ahmad Syarifuddin et al., 2021; al., 2021; Jumiah et al., 2021). With the influence of technology and student readiness nowadays, various types of assessments are proposed such as Cognitive Psychology and New Tests of Intelligence by Joseph (1991) which involve cognitive-psychological abilities, information processing and psychological development. Similarly, the impact of assessment stated by Darling-Hammond et al (2010) in the implementation of performance testing is seen as more practical in addition to the application of summative and formative assessment. As noted in the discussion of new models of

assessment in the 21st century, various forms and types of assessment exist to assess consistently and relevantly to student achievement. Among the popular assessments are formative and summative assessments. This type of assessment provides space for students and teachers to see changes and progress in the learning process for students and teaching for teachers (Mohd Ali et al., 2021; Parimala et al., 2021; Siti Jamilah et al., 2021; Nor Fauziyana et al., 2021; Noel et al., 2021). According to PFCS (2007), formative assessment conducted after a lesson has taken place can enrich students' knowledge.

According to Eric (2002), the goal of formative assessment is to gain an understanding of what students know (and don't know) in turn making responsive changes in teaching and learning appropriate to the learning environment of this century. Whereas according to Catherine & Michael (2011), summative assessment goes too far down the path of learning to provide information at the classroom level and to make teaching changes and interventions during the learning process. Through this opinion, we can state that this formative and summative test is very suitable to be conducted nowadays. The assessments proposed by many researchers and educational practitioners in the 21st century reflect the objective towards producing students who are competent in problem solving skills, technology use and productivity (Ahmad Shafarin et al., 2021; Junaidah et al., 2021; Farah Adibah. et al., 2021; Ahmad Shakani et al., 2021; Muhamad Amin et al., 2021). For Shaffer et al (2009), a specific and relevant assessment in this 21st century is the introduction to digital methods. In his study, the introduction to epistemic testing was also oriented to assessment using computers.

The implications of 21st century competence have also given rise to various other forms of assessment as suggested by Joseph (1991) in his specific study related to testing and evaluation namely Cognitive Psychology and New Tests of Intelligence, Improvement in Tests of Neuropsychological Functioning, New Tests of Personality and Individual Predispositions, Assessing Personal Competence and Quality of Life and Computerized Assessment Interpretation. All of these assessments are related to students' skills in critical thinking, problem solving, computer use as well as cognitive-psychological abilities (Santibuana et al., 2021; Nor Diana et al., 2021; Zarina et al., 2021; Khairul et al., 2021; Rohani et al., 2021). Overall, the type of assessment conducted in this century meets the competencies of the more skilled and diverse students. This implication has changed the traditional way of assessment that is more concerned with cognitive achievement alone.

Along with the changes that have taken place in the form of assessment today which is more concerned with the continuous knowledge of students, the instruments used in assessment have also changed. No longer just focused on pencil and paper alone like traditional assessment methods, the instruments used are more subjective and comprehensive. In formative and summative assessment for example, students are assessed through the results of their discussions, handling the assignment process as well as portfolio preparation (Badaruddin et al., 2021, Abdul Rasid et al., 2021). According to Eric (2002), no specific instrument is used however teachers can evaluate by asking students to discuss their thoughts on a question or topic in pairs or small groups, then asking a representative to share thoughts with the larger group.

## **Conclusion**

The implications of this 21st century assessment instrument are more to the use according to the appropriateness of the learning objectives. Teachers can construct and select instruments that they deem appropriate to assess the skills they want to test on students.



According to Caroline et al (2008) in their study, the use of computers and gadgets is an instrument used to test the competence of students developing websites. As is well known, the use of computers is indeed a popular testing tool nowadays. As Ellen et al (2015) in their study regarding virtual testing proposed the method of E-Formative Assessment with the use of internet and computers. In addition to the use of computers, current assessment instruments have also covered portfolios, coursework and so on. According to Eric (2002), evaluation can be carried out with the use of portfolios, scrapbooks, observations, checklists and others. Assessment is now seen as more comprehensive and fairer in accordance with the passage of time which reflects the diversity of abilities and skills of students.

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