International Journal of Advanced Science and Technology
Vol. 29, No. 8, (2020), pp. 662-671

Didactic Model of Information and Communication Technology Literacy of Vocational Teachers

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Abstract

This study synthesizes the findings of a study on the didactic model of information and communication technology literacy vocational school teachers. Journal studied from 2015 to 2019. This paper focuses on the issue of vocational teacher preparation in the face of the 21st century vocational learning. Learning can be done in a virtual way, online, and remote; in other words that it does not need a place. Teachers must have the skills to deal with it, including ICT literacy and communication. Literacy 21st century learning all this in addition to reading and writing, literacy also has a wider meaning, namely, technology literacy, information literacy, media creativity and responsibility and social competence. Of the few studies that have been carried out didactic model of information and communication technology literacy vocational school teachers as one of the solutions is done in the face of 21st century learning vocational didactic models analyzed are TPACK. Technological Pedagogical and Content Knowledge (TPACK) known in the field of educational research as a theoretical framework for understanding the knowledge needed by teachers to integrate the three domains of knowledge of technology, pedagogy and content. 21st century learning requires teachers to have good didactic skills and to be supported by abilities in their ICT fields. The ability of ICT is related to teacher literacy in ICT.

Keywords: *didactic model, ICT literacy, vocational teachers*

1. Introduction

Demands teacher in the 21st century to create an innovative and creative learning integrated with ICT as an effort to enhance the learning process is a serious problem [1]. The development of ICT has brought considerable influence on the field of education in the learning process, it makes the ICT integration into teaching and learning in the classroom continues to be a task that needs to be developed by teachers [2]. The integration of technology in education is still a learning innovation that cannot be implemented by the majority of teachers, teachers are still experiencing difficulties in integrating ICT in the learning process [3].

Difficulties in integrating ICT teachers due to the nature of technology that does not keep means technology continues to grow, as it is the teacher should be able to adjust with the development of technology to be applied in the learning process [4]. Integrating ICT in the learning process of introducing a set of new variables in the context of teaching, and adds complexity because of the nature of the rapidly changing technology abreast [5]. Many factors lead to low ability of teachers to use and access to ICT, including age, gender, work experience, educational background [6]-[8], 21st century learning requires

teachers to actively engage with ICT, especially in education [9]. Integration of ICT in learning not only provides updates to the role of teachers in the classroom, but also create a more dynamic learning environment in which students can be more focused and motivated to learn [10-][11].

Therefore, the 21 century learning requires teachers including school teachers Vocational High School (SMK) in order to have a good didactic capabilities and supported by capacity in the field of ICT has. ICT capability is related to literacy teachers to ICTs [12]-[13].

This study has the objective to didactic models assessing ICT literacy and vocational teacher communication in the face of 21st century learning. Educators and researchers can use this information to identify issues or questions unanswered in the literature and define the direction of future research on didactic models of ICT literacy and vocational teacher communication in education, in the face of 21st century learning.

2. Methodology

Writing survey is distinguished by perusing the Web of Science database, trailed by Scopus by entering the watchwords "instructional model" and "ICT proficiency." accordingly, upwards of 20 articles over the most recent 5 years with a powerless period somewhere in the range of 2015 and 2019. Of the 20 articles got then read, investigated and coded utilizing a spreadsheet program.

Coding plan is adjusted from an organized methodology/foundational to the survey of the writing. Approach utilizing the four primary classes in breaking down the article, specifically the accompanying:

a. Basic information: creator, year of production, diaries, spot of study
b. Methods: look into approaches, techniques, topics, information assortment, investigation strategies, explore
c. Content investigation: instructional models, ICT proficiency and correspondence, and track content territory planned (i.e., how the analyst/teacher gets ready training for understudies notwithstanding 21st century learning)
d. Discussion: issues tended to, the future direction, individual remarks

3. Results and Discussion

3.1. Vocational Education 21st Century

In the 21st century learning, learning can be done in a virtual way, online, and remote; in other words that it does not need a place. As dictated by the Partnership for 21st Century skills, in 2006, that this was a better way to improve the quality of education by setting up the learning needs of students in accordance with the development as well as creating more effective learning. 21st century learning environment consists of structures, equipment, and governments that support the spirit of teachers and students to follow the development of knowledge and ability as we all are learning the demands of the 21st century [10], [14].

Teaching and learning in the 21st century there is a shift from a teacher as the center for the center of the student in the learning approach. Engaging effectively and interactivity between teacher and student collaboration and cooperation among students actively learn and use ICT for teaching and learning equipment [15]. The realization of the 21st century is the ability of renewable dependent apparent to a positive attitude towards the use of ICT in teaching and learning equipment. Integrating ICT in teaching and learning not only bring about a change in the role of teachers in the classroom, but also to create vibrant and student learning and student motivation becomes more focused. In such an environment, the teacher plays the role as a facilitator [16].

Therefore, students experience high demand in the 21st century, requires the development of teachers as well as the importance of integrating ICT in teaching and learning. Teachers require intensive participation in technology-based training curriculum even further beyond basic computer skills for activities / training teaches how to integrate technology into the curriculum. Additionally, foster a positive attitude toward technology and teachers to encourage them to integrate technology in learning [17].

Vocational education requires students to have the required competencies of the workforce and to follow the developments and demands of the times. Generic competence required by the working world in the 21st century: (1) expert in the domain of work procedures; (2) have the intelligence to act effectively if needed); 3) skills of literacy, including mastery of ICT;(4) the attitude of commitment and attention to the work; (5) understand the social and economic impacts of the work; and (6) independently of learners has a tough attitude to the continuous improvement [18]. Ability in the world of work requires the ability to articulate applications to suit the context of the problems faced [19]. Then, as a teacher have a responsibility as a facilitator has to be able to facilitate ICT literacy learner's circuitry well. As the times, there has been some shift in the roles of teachers, learners, curriculum and media applications such as in Table 1.

Table 1. Changes Role of Teachers, Learners, Curriculum and Media Applications

Aspect	From	To
The role of teachers	The transmitter of knowledge	mentor and The facilitator
	controller learn	Creator of learning environments
	Expert	Collaborator and partner learning
	Expository / Teaching	Interactive / experimental / exploration
Role of Learners	Passive	Active
	Absorbing knowledge	Generate new knowledge
	dependent	Autonomy
	Solely learning content	Continuous learning / creative / communications / Thinkers
Curriculum	Memorizing facts	Invention
	teaching practice	Authentic learning
	Strict time	Flexible / Open / anytime and anywhere
	based traditional	competency-based
media applications	single simulation	simulation plural
	a single media	multi media
	One-way communication	Two-way communication
	source limited	digital source

3.2. Vocational Skills Industry Era 4.0

Human workers are required to have the Traffic required by the industry as capital into the industrial market. Workers who are too old ranging from age, not honed skills and abilities will be minimal compared to the 4.0 era industries [20]-[21]. In the industrial era 4.0 This, the workers were supposedly able to follow the development of technology based on CPS, if it cannot follow it then most likely these workers will be left behind even replaced by technological advances that provide many benefits with low cost high for the industry. 4.0 This makes the smart industrial factory system applying advanced information and communication technology-oriented progress in the future [22]. So as teachers need to pay attention to what kind of vocational skills needed of workplace in the

industrial age 4.0 to be able to prepare their students to compete and win the competition [23]. Some concern in the implementation of the tasks in the industrial age 4.0, as follows:

1. Insight into the production of information and technology;
2. Insight into software;
3. Understanding the Hybrid Functions Exercise;
4. Experience in the field of mechatronics;
5. Sharpening capability in the field of social co-workers;
6. Refine upon ability in the use of software;
7. Being able to change the program if necessary;
8. Being able to execute tasks in measurable;
9. Being able to take a decision;
10. Skilled in the art at least 2 years;
11. Able to use the internet both manually and using data;
12. Extensive insight and direction;
13. Experts in the process and the use of technology;
14. Having an optimistic soul;
15. Able to read and assess the data on the use of tools or machines used.

From the description the tasks carried out in the industrial era can be concluded that workers should be able to develop skills that are owned to meet the needs of industry in the industrial era 4.0.

3.3. 21st Century Skills Vocational Teachers

The skills needed by workers in the 21st century change and increasingly linked to the use of creative technology. Education is at the heart of that change. Teachers of the 21st century should help to equip future generations to thrive in a fundamental change in the environment that is so fast and continuously and are able to utilize their own abilities as the implications of the learning process [24]. Teachers of the 21st century demanded not only able to teach and manage classroom activities effectively [25]. But are also required to be able to build effective relationships with the students and school community, using technology to support the improvement of the quality of teaching, as well as the reflection and improvement continuous learning practices [14]. Professional Teachers of the 21st century is a skilled teacher in teaching, able to build and develop relationships between teachers and schools with broad community, and a learner and an agent of change in schools [26]. Besides, teachers must have four compulsories namely pedagogical competence, social competence, professional competence and personal competence [27].

In contrast to public school teachers, vocational education teachers have different characteristics. So a teacher must pay attention to the vocational competencies that must be possessed by students and teachers. Especially a teacher must understand and be able to implement the competency standards of vocational school teachers as in the table below.

Table 2. Vocational School Teachers Competency Standards [29]

Technology Literacy Approach		
Vision and policy	The arrangement objective of this methodology is to plan students, residents, and laborers had the option to take the new innovation so as to help social turn of events and improve monetary profitability. Related instructive approaches objectives incorporate expanding school enlistments, making quality assets accessible to all, and improving essential education aptitudes, including innovation proficiency.	
	Curriculum Objectives	Teacher competence
Policy	Police Awareness, With this methodology, the program makes an immediate association between the strategy and classroom practice.	Teacher thought to know about the strategies and can decide how study hall practice as per the arrangements and government support
Curriculum and assessment	Essential Knowledge, Curriculum changes performed by this methodology may incorporate improving fundamental education aptitudes through innovation and including the advancement of ICT abilities in a pertinent setting, which will include time in the educational plan of different subjects for the joining of different wellsprings of important ICT and devices to improve the efficiency of learning.	Teachers must have a solid information about the standard educational program subjects, just as information on standard evaluation methods. Likewise, educators must have the option to coordinate the utilization of innovation and innovation gauges for understudies into the educational program.
	Curriculum Objectives	Teacher competence
pedagogic	Incorporating Technology, Changes in instructive practice include the coordination of different innovations, devices, and e-content as a feature of the entire class, gathering, and individual understudy exercises to help viable learning process.	Teachers must know where, when, and how to use technology for teaching and learning activities and presentations.
ICT	Basic tools, The technology involved in this approach include the use of a computer along with the software; web content; and the use of the Internet as a learning support.	Teachers should know the basics of hardware and operating software in the form of supporting applications, web browsers, communication, presentation, and application management.
Administration & Settings	Standard Class. Small changes in the social structure occurs in this approach, spatial placement and integration of technology resources in the classroom or in the laboratory.	Teachers should be able to use the technology in the whole class, small groups and individual activities as well as ensuring access evenly.
Teacher	Digital Literacy, The implications	Teachers must have the

Professional Development	of this approach for teacher training focus on developing digital literacy and the use of ICTs to improve teacher professional.	technological skills and knowledge of Web resources necessary to use technology to acquire additional subject matter and pedagogical knowledge in support of the professional development of teachers themselves.

From the above description, ICT literacy by teachers are expected to bring a positive influence on the advancement of education, so it is important for teachers to know ICT competence.

3.4. Literacy Information and Communication Technology (ICT) Vocational Teachers

Literacy has the meaning of literacy and people who have the ability to read and write are called literate persons or literacy [28]. Literacy is also referred to as the ability to identify, understand, interpret, create, communicate and compute, printing and writing material related to a variety of contexts [29]. But understanding literacy All 21 centuries besides reading and writing, literacy also has a sense as follows; (1) Literacy technology: the capacity to exploit new media, for example, the Internet to get to and convey data viably. (2) Information education: the capacity to gather, sort out, channel and assess data and to frame a strong feeling depends on the capacity; (3) Creativity media: the developing limit of people wherever to make and disperse content on an assortment of crowds; (4) The duty and social skill: fitness to consider the social outcomes of online distributions and obligation towards kids [30]-[31].

3.5. Didactic Model Technological Pedagogical and Content Knowledge (TPACK)

Didactic defined as the science that gives a description of the activities that lead to the process of teaching and learning process [32]-[33]. From this viewpoint, didactic contains two kinds of activities, including teaching and learning activities. Both pupils and teachers, both active so manifest teaching and learning in the same time. So that the learning process is planned in line with expectations, both students and teachers need to have the attitude, ability and skills that support the learning process itself [34].

Didactic means of teaching science based on the principle activities of the subject matter so that the delivery of the subject matter can be absorbed by the student. Activities that mean that direct the activities that the interaction of teachers and students during the learning process takes place [35]. Broadly speaking, it can describe the activities of teachers in presenting the material, and how teachers can attract, motivate and activate the student during the learning process. Therefore, ongoing learning activities that aim to influence the students and get to know a student's personal characteristics that can be targeted didactic [36].

Didactic depiction in education, are in the loop didactic presentation of learning materials. While the model moves in circles provision of road that must be travelled before the learning process. If we relationships between models and didactic, are in preparation for teaching. The learning process that is implemented is expected to go as planned, starting from preparation to implementation [37].

Didactic models analyzed in this study using the TPACK. TPACK known in the field of educational research as a theoretical framework for understanding the knowledge needed by teachers to integrate the three domains of knowledge of technology, pedagogy and content [38]. In development acronym TPACK converted into TPACK to make it

easier to remember and to establish integration between the three types of learning, technology, pedagogy and content [39]. TPACK framework adopted from Schulman construction of the PCK by incorporating technological knowledge that is placed together with the content knowledge and pedagogy.

TPACK is a framework that describes the relationship between the three components and the complexity of the knowledge base (technology, pedagogy and content) [38]. On slices of 3 types of knowledge are content with an intuitive understanding of teaching and technology pedagogical methods accordingly. seven components included into the framework of TPACK are:

1. Technology knowledge (TK): TK is knowledge of various technologies ranging from low tech (low tech) such as a pencil and paper to digital technologies such as the internet, video, interactive whiteboards, and a software program.
2. Content knowledge (CK): CK is the information on the material which will be instructed. An instructor should think about the substance they will educate information.
3. Pedagogical knowledge (PK): PK identifies with techniques and procedures, remembering information for educating and study hall the executives, appraisal, exercise plan improvement (RPP), and understudy learning.
4. Pedagogical substance information (PCK): PCK-related information content identified with the way toward educating [43]. PCK is distinctive with various kinds of substance, in light of the fact that PCK is a blend of substance and instructional method with the intend to build up the act of showing a superior substance.
5. Technological substance knowledge(TCK): TCK is the information on how innovation can make new portrayal for explicit substance. By utilizing a particular innovation, the educator can change the manner in which instructors prepared and comprehend the ideas in explicit substance.
6. Technological educational knowledge(TPK): TPK information about how different innovations can be utilized in instructing and to comprehend that the utilization of innovation can change the manner in which instructors instruct.
7. Technological educational substance knowledge: TPACK related with the information required by educators to incorporate innovation into showing explicit substance. Instructors have an instinctive comprehension of the unpredictable cooperation between the three essential segments of information (content, instructional method, innovation) to show the substance utilizing educational techniques and proper advancements.

TPACK is a valuable structure for considering what information should an educator need to incorporate innovation into instructing and how they can build up this knowledge [40]. TPACK appropriateness as a system for estimating information on educating can affect the kind of preparing and expert advancement experience intended for forthcoming instructors and teacher [41]. Therefore, it is a ceaseless need to reconsider our readiness rehearses in the field of educator training and propose new procedures that better get ready educators to coordinate innovation into their instructing.

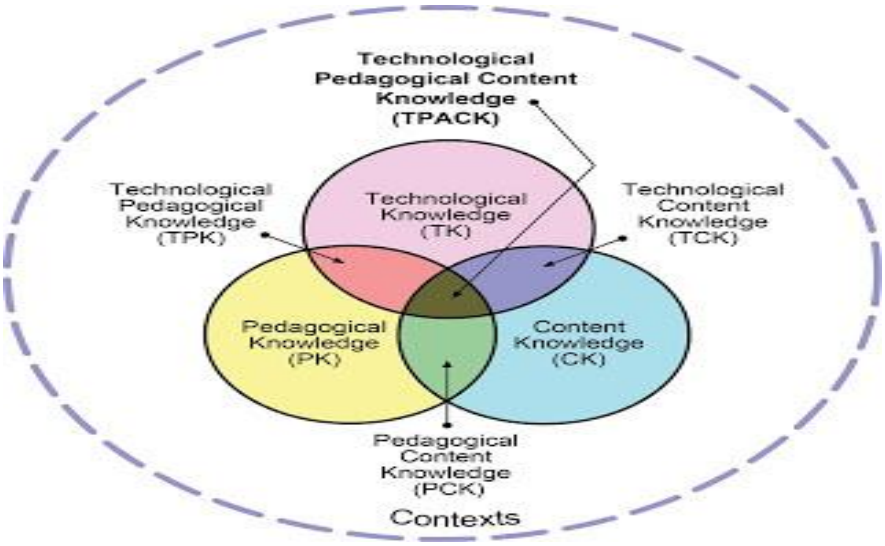

Figure 1. TPACK framework [42]

4. Conclusion

The process of learning in the 21st century there is a shift from a teacher as the center for of the student in the learning approach. To face 21st century learning skills of teachers of vocational 4.0 era industry. The skills needed by teachers vocational 4.0 era industry in the face of 21st century learning associated with the use of creative technology. In contrast to public school teachers, vocational education teachers have different characteristic then teachers should pay attention to vocational competencies that must be owned learners and teachers. Especially a teacher must understand and be able to implement a vocational school teacher competency standard. Literation learning The 21 century to be dominated by the teacher is, Technology literacy, information literacy, media creativity and responsibility and social competence. The didactic model of information and communication technology literacy vocational school teachers as one of the solutions is done in the face vocational learning 21st century.

Acknowledgments

Authors wishing to acknowledge assistance or encouragement from colleagues, special work by technical staff or financial support from organizations should do so in an unnumbered Acknowledgments section immediately following the last numbered section of the paper.

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