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Integrating HOTS-Based Student Electronic Worksheet: Teaching Styles in Elementary School During the COVID-19 Pandemic

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Abstract

This study was conducted to help improve elementary school students' critical thinking skills by integrating student electronic worksheets (SEW) in distance or virtual learning. This research uses a mixed-method, combining quantitative and qualitative, with research instruments in the form of questionnaires, observations, and interviews, executed by the researchers with a sample of 108 students (56 male and 52 female) and six teachers at the State Elementary School 19 of Rambang Niru in Palembang revealed that: 1) teachers have not adopted technology-based learning aids such that the student worksheet is still in the form of sheets of paper; 2) most teachers lack experience in making SEW; 3) the questions given to students are not higher-order thinking skills (HOTS)-based. It is attributable to the fact that teachers still use classical media (WhatsApp) in virtual learning. Thus, the learning materials delivered by the teacher to students are less attractive. This condition lowers students' interest in learning and, in turn, makes it difficult for students to understand the lessons delivered by the teacher. The most noteworthy finding in this study is the teacher's activity in using SEW with HOTS-based questions. The researchers noted that integrating a SEW made by inserting lessons and explanations in the form of video and audio and adjusting the learning materials according to the students' grade level made the students more interested in learning and more confident in answering questions using electronic media.

***Keywords*:** distance learning, elementary school, student electronic worksheet, higher-order thinking skills

Introduction

Learning style in the contemporary digital era supports the teaching and learning process at every level of education. Due to the COVID-19 pandemic, the current global situation has forced most countries to halt face-to-face teaching activities and begin online mode-teaching (Demuyakor, 2020). The Indonesian Ministry of Education and Culture (Kemendikbudristek, 2021) urges that teaching and learning activities from elementary school to university can be conducted from home by adopting modern technologies. Although technology cannot completely replace a teacher, it can still help ease the teaching and learning process. Since the emergence of the pandemic aligns with the rapidly growing technology, teaching and learning activities are primarily conducted in a virtual model using electronic media. Technology is required to achieve learning objectives in the current pandemic through long-distance or online learning; however, it

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does not reduce the effort required to gain knowledge (Adu et al., 2022; Tondeur et al., 2017).
Teachers must be trained to adapt themselves to such extraordinary situations where they must use electronic devices such as smartphones or laptops as the equipment used to convey learning materials to students. Most teachers only possess basic pedagogical knowledge, even though, according to the 2013 curriculum, a teacher must also master, utilize, and be able to apply technology-based media so that the teacher can operate a computer or laptop for smooth delivery of learning materials to students (Erbilgin & Şahin, 2021; Rahmadi et al., 2020; Syamsi, 2014).
The goals can be measured in various ways in the learning process, one of which is through the students' learning outcomes. Therefore, appropriate learning strategies are required to improve learning outcomes in the classroom. Furthermore, critical thinking skills are essential in dealing with problems in the learning process. According to Santrock (2012), critical thinking is a form of thinking executed actively and continuously, and the consequences of this activity will produce or involve specific evidence. Meanwhile, Jensen (2011) stated that critical thinking is an attitude process conducted by everyone to produce vital knowledge or idea.
Critical thinking ability can also be called thinking skills. It is necessary to implement appropriate learning strategies, suitable teaching materials, and learning equipment facilitating effective delivery of material to students to upgrade students' thinking skills. It is the students' worksheet, where the roles and activities of students can be seen, and they can fully interact with the learning materials provided (Hanafiah & Suryani, 2021).
Online learning has become a viable option to break the boredom of students learning in face-to-face settings (Fisher & Baird, 2006). The blended mode has recently evolved as an effective way to execute teaching and learning activities. Although this model requires a support device that may be reasonably expensive, it is effective and easier to implement.
Teachers must employ technological assistance by developing a breakthrough known as the Student Electronic Worksheets (SEW), containing lessons, explanations in the form of video or audio, and elaborating the learning materials. In this way, students are more interested in learning and more confident while answering questions using electronic media. Making the SEW is supported using a framework of the Technological and Pedagogical Content Knowledge (TPACK) (Voogt et al., 2013), where students must complete a technology-based worksheet containing the learning materials, new for the students. Thus, the questions are designed using HOTS to stimulate students' thinking levels, so they are accustomed to working on HOTS-based questions.
Face-to-face interviews conducted by the researcher from January 11 to February 3, 2021, with the fifth-grade teachers at State Elementary School 19 of Rambang Niru revealed that: 1) the teachers have not made technology-based learning equipment, in which the student worksheet made is still in the form of sheets of paper only; 2) the teachers do not have any experience in making SEW, and 3) the questions given to students are not based on HOTS. It is attributable to the fact that teachers still employ classical media (e.g., WhatsApp) in the virtual learning process. Thus, the learning materials delivered by the teacher to students do not attract the students' learning interest. Therefore, it becomes challenging for students to understand the instructions given by the teachers. One solution teachers can use to overcome the problems above is to use SEW packaged in an attractive form so that they can be adapted to extraordinary conditions such as the current global pandemic.

Literature Review

HOTS in Bloom Taxonomy

HOTS was originally known as the Benjamin S. Bloom concept (Bloom & Krathwohl, 1956), categorizing various levels of thinking called Bloom's Taxonomy, ranging from the lowest to the highest. This concept entails a learning goal divided into three areas, i.e., cognitive (mental and knowledge), affective (attitudes and feelings), and psychomotor (physical abilities). HOTS is part of the cognitive realm in Bloom's taxonomy and aims to hone mental skills in the knowledge aspect. Bloom's cognitive realm was later revised by Krathwohl (2002).

Bloom's taxonomy describes six types of learning: 1) knowledge, 2) comprehension, 3) application, 4) analysis, 5) synthesis, and 6) evaluation. The first two types, knowledge and understanding, do not require critical thinking skills. However, in the last step, applications, analysis, synthesis, and evaluation require a high level of reflection, characterizing critical thinking. Definitions of this category provide a seamless transition from educational theory to practice with a distinctive assessment design that researchers and instructors can use to assess students' skills born in a particular category. Other researchers and even entire departments have studied how to apply Bloom's taxonomy to refine questions and encourage teaching strategies (Krathwohl, 2002). Nowadays, many researchers have switched to using the new version (Hanafiah & Suryani, 2021; Ichsan et al., 2019a), like in this study that used the new version of Bloom's taxonomy. The difference between the new version of Bloom's taxonomy and the old version appears in table 1.

Table 1

Version Differences in Bloom's Taxonomy

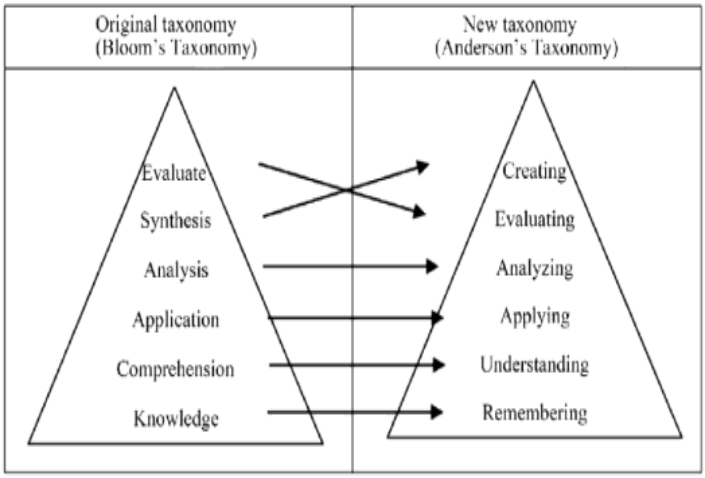
Old Version	**New Version**	Learning Outcomes	**Key Words**
Knowledge	Remembering	Recall information	Identify, describe, name, label,
Comprehension	Understanding	Understand the meaning, paraphrase Concept	Summarize, convert, defend, paraphrase, interpret, give
Application	Applying	Use the information or concept in a new situation	Build, make, construct, model, predict,
Analysis	Analyzing	Break information or concepts into parts to understand it more fully	Compare/contrast, break down, distinguish, select,
Synthesis	Evaluating	Put ideas together to form something	Categorize, generalize,
Evaluation	Creating	Make judgments about value	Appraise, critique, judge, justify,

Adopted from Krathwohl (2002)

Bloom's taxonomy underwent a major overhaul in 2001 by Anderson, Krathwohl, and others. Following the revision, Bloom's most recent taxonomy was created. The original taxonomy has been updated to include a two-dimensional structure, which the revised taxonomy introduces. These two dimensions are cognitive process and knowledge. The initial taxonomy proposed by Bloom is analogous to the cognitive component. There have been relatively few noteworthy modifications made (Wilson, 2016). The position of cognitive levels, assessing, has now taken precedence over producing, which is another difference. Both of the points that follow have been modified as in Figure 1 (Wilson, 2016).

Figure 1

Anderson Taxonomy



It's time to move away from non-algorithmic instruction that emphasizes low level thinking (LOTS) and focus on high-level thinking skills (HOTS) (Ichsan et al., 2019)). There are two separate dimensions to the cognitive mechanism in the Anderson and Krathwohl's revised Bloom taxonomy. Memorizing (C1) explains LOT and how it differs from other types of memory retrieval and recall. Contextual understanding (C2) is the process of extracting meaning from various forms of communication (oral, textual and visual) and applying it to one's own contexts. Executing or enforcing an action is defined in C3. HOT is defined by C4. Analyzing (C5) is the process of separating, organizing, and assigning the various components of a given piece of content in order to better understand how they relate to one another and the overall structure or function. Analyzing is the process of analyzing and evaluating information to arrive at conclusions based on criteria and standards. Creating (C6) is the process of putting together parts to create a new pattern or structure through the use of development, design, or manufacturing (Ichsan et al., 2019)

Integration of HOTS-TPACK in Electronic Teaching During Pandemic Era

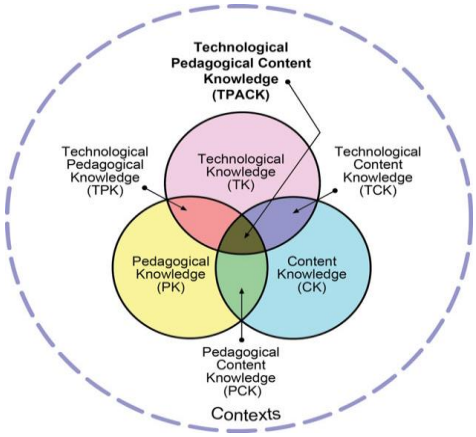
TPACK is one of the frameworks implemented to overcome the learning loss due to the COVID-19 pandemic in Indonesia and improve critical thinking skills and the ability to argue (one of the indicators in HOTS).

According to Heck & Strohfeldt, (2011) and Voogt et al. (2013), the framework characterizes the use of technology and blends it with pedagogy, content, and knowledge. One of the learning models due to TPACK-based development is blended learning (hybrid learning) that combines face-to-face and online learning. Teachers can utilize existing blogs or websites for online purposes or even create and develop their own (Harrak et al., 2019; Hlatshwayo et al., 2022; Vaughan, 2014).

Mishra & Koehler (2006) argued that a framework is increasingly being used to determine whether teachers are effectively teaching using technology. An educator can thus use a learning framework referring to the 2013 curriculum; that is, TPACK, wherein through this approach, content and pedagogical aspects are involved, and aspects of technology usage as a learning media that will upgrade students' knowledge. Here is the TPACK framework written by Mishra & Koehler appearing in Figure 2.

Figure 2

TPACK Framework from *Mishra, P., & Koehler, M.J. (2006)*



(Source: Adopted from Mishra & Koehler, (2006)

In teaching-learning, a teacher must combine lessons, pedagogical and technological knowledge, and the interaction of any knowledge that will be shared with the students. Thompson & Mishra (2007), as cited in Dias & Ertmer (2013), stated that seven different types of knowledge are needed for the integration of knowledge and technology: Content Knowledge (CK); Pedagogical Knowledge (PK); Technological Knowledge (TK); Pedagogical Content Knowledge (PCK); Technological Content Knowledge (TCK); Technological and Pedagogical Knowledge (TPK); and TPACK.

Since the emergence of the COVID-19 pandemic, teaching and learning activities have transitioned from face-to-face to online mode to reduce the risk of exposure to the virus (Graham et al., 2020). Ajmal et al. (2019) remarked that online learning, where learning is executed with the help of telecommunication devices, is a form of learning separating teachers and students physically.

In addition, Kachalov et al. (2020) stated that distance (online) learning is another way of learning that can be implemented during the pandemic. This type of learning seems effective and low-cost. Moreover, it does not reduce the learning process and can be done anytime. Cheng (2020) and Belay (2020) stated that the current situation could be referred to as "School is Out, But Class Is On," meaning that even though virtual mode or also known as learning from home, does not decline the enthusiasm of students to accept the lessons as usual. The above-mentioned studies confirm that even during the pandemic, the learning process can continue, and schools can use distance learning that is effective, efficient, and flexible.

Student Electronic Worksheets (SEW) HOTS-based

Student worksheets are used by students in learning activities for interaction between students and teachers. On the one hand, Prastowo (2011) noted that student worksheets are printed teaching materials in the form of sheets of paper containing lessons, summaries, and instructions for working on a learning task that must be completed by students aligning with the learning objectives. On the other hand, Kaymakci (2012) stated that the form of teaching materials could be visual, audio, and other interactive media. One of the teaching materials' visual forms with a

vital role in learning activities is the Student Electronic Worksheets (SEW). Meanwhile, Abdurrahman et al. (2020) stated that using student worksheets in learning can improve students' critical thinking skills.

In line with the previous opinion, a student worksheet has an equally crucial function as learning by using other teaching aids (Untayana & Harta, 2016), as cited in Sagita et al., (2018). According to Winder, worksheets are as necessary as lesson plans requiring teaching aids. Another opinion regarding teaching aids is as follows.

> "Your plan for a topic should include details of relevant resources, such as textbooks, worksheets, and ICT resources web-based materials"

(Sarah & Rani, (2020) argued that student worksheets are the media students can use to take lessons and do exercises. Live Worksheets software is a place to enter data, or material users will submit through Google Chrome (online). Teachers can develop this worksheet and design it according to the situations and conditions in the learning activities that will be executed.

Concerning the recent technological developments, teachers can use the help of this software while performing their teaching duties. According to Cruz (2013), Live Worksheets is a website that allows students to convert worksheets that can eventually be printed to produce hard files (e.g., doc, pdf, jpg, and others) into existing more interactive worksheets. It is a way of modifying a worksheet from sheets of paper into an interactive technology-based worksheet without changing the orders and rules of the worksheet itself for students. The tasks are in the form of multiple-choice, essay, and matching and are equipped with video and audio recordings with the rules for completing assignments online with the help of smartphones. Also, students' scores will automatically appear if they have completed and submitted their assignments on the Live Worksheets website.

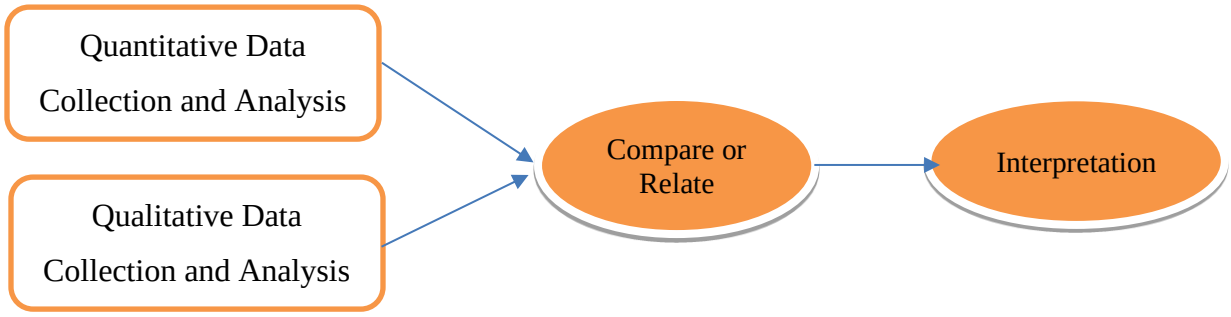
Method

Design

Our study uses a mixed-method research method, meaning that it uses the procedure of combining quantitative and qualitative data to obtain a comprehensive analysis of research problems (Creswell & Creswell, 2018). Both methods were developed using a case study design to single-case. Yin (2018) explained that this type places the case as an object of research that needs to be researched to reveal the deep essence lying behind the case. It is not tied to the unit of analysis because our study's unit of analysis is fused with the case, namely the application of HOTS-based SEW in one location of a village school (Creswell & Creswell, 2018; Yin, 2018). It explored the integration of HOTS-based SEW as one of the learning innovations during the pandemic such that learning was not executed through WhatsApp groups. Quantitative data are used to discover how students respond to SEW using a descriptive method. The mixed-method design is seen in Figure 3.

Figure 3

Research design of mixed method: Convergent Parallel Design



Source (J. W. Creswell, 2014)

Based on the Fig 1, this research developed quantitative design as the first part where a questionnaire was used as the main tool of data collection. The answers of the questionnaire were elaborated then in-depth phenomena in the answers were described into more details through an interview. This way, the questionnaire was used to elaborate quantitative data and the answers of the questionnaire were developed in-depth through interview to deepen qualitatively through interview.

Participants

The participants of the study were 6 teachers and 102 students totaling 108 selected from 6 schools. (See table 2). Our study focused on teachers and students at State Elementary School 19 of Rambang Niru, one of the villages in Palembang. The school was chosen because of its location and characteristics as an urban area with adequate internet accessibility. Participants were carefully selected with the following criteria to achieve this purpose: (1) six (6) teachers of the fifth-grade students; (2) as many as 108 students in the fifth grade, with the consideration that at this level, they can be invited to think at a higher level, and; (3) classes that have been doing virtual learning for the last two years.

In line with the mixed methods, the whole 108 respondents were assigned to collect the quantitative data obtained from the questionnaire. To collect the qualitative data from which an interview was conducted, 12 respondents were selected for interview (Krippendorf, 1984). As suggested by Krippendorf (1984) the number of respondents in a qualitative research should consider the appropriateness of the information. In other words, the whole respondents of this study is 108 to participate in the quantitative methods, and 12 of them were involved to collect the qualitative data from an interview. The 12 respondents were selected using purposive sampling.

Table 2

Respondents of this study

No	School	Teacher		Students		Total	
		f	%	F		f	%
1	S-1	1	.93	17	15.7.4	18	16.67
2	S-2	1	.93	17	15.7.4	18	16.67
3	S-3	1	.93	17	15.7.4	18	16.67
4	S-4	1	.93	17	15.7.4	18	16.67
5	S-5	1	.93	17	15.7.4	18	16.67
6	S-6	1	.93	17	15.7.4	18	16.67
		6	5.58	102	94.44	108	100.2

Instrument

The research instruments used in this study are check list, observations, interviews, and document analysis. The checklist was used to collect data on the quality of the worksheet quantitatively. The checklist was developed into verbal data through observation and interview to elaborate the data into qualitative data.

Observations were made on six teachers and 108 students by filling out the checklist observation sheets and answering simple questions during the interview. The researchers also observed the SEW document as instruments in the form of daily observations and interview sheets distributed to participants through Google Form, as is the case in disseminating its questionnaires through the g-form. They went directly to State Elementary School 19 of Rambang Niru to check the requirements for implementing ICT-based products and see the students' data in the study. This step was executed to develop a product, which could later be run or used with the help of a smartphone. Thus, the researchers needed to see the availability of these devices for each student.

Data Collection

The data sources used in this study are divided into primary and secondary. Primary data are data in the form of the speech obtained from verbal discourse, behavior, or personality of the subject of research conducted by a trustworthy subject or information obtained from the reality of the respondent. The primary data sources in this study are the data obtained from informants; influential people collecting data. The quantitative data obtained are subsequently presented as a description of the data.(Sugiyono, 2017) Qualitative data are obtained directly through interviews and observations. Qualitative data used in this study include interview materials with questions stored in text files and open-ended questions, and audio recordings to explore the interview content further.

Interviews were conducted with the six teachers of the fifth-grade students. The interview was related to the use of student worksheets given to students and their responses while using SEW. The researchers made two validation sheets to assess several aspects regarding the suitability between the developed SEW and the "learning science materials" presented on Theme 3 ("healthy food") and Sub-theme 1 ("How does the Body Process Food?") in the fifth grade of elementary school students.

Data Analysis

Quantitative data obtained from the scores of SEW was analyzed through descriptive statistics focusing on mean, rate percentage, table and diagram. In addition, the qualitative data analysis

was based on Krippendorff's (2022) theory on content analysis. What is meant by the design of the analysis here is a content analysis solely for description, describing aspects and characteristics, and not intended to test a particular hypothesis or the relationship between variables. In this case, SEW analyzes the contents of written information with the following research steps (Bauer, 2007).

The data triangulation technique was executed by giving a checklist observation sheet to the fifth-grade students about the teacher's teaching style by using an e-worksheet. Notably, this teaching style is only limited to State Elementary School 19 of Rambang Niru and cannot be generalized to other schools in the city of Palembang. Thus, this research is only limited to the type of case study.

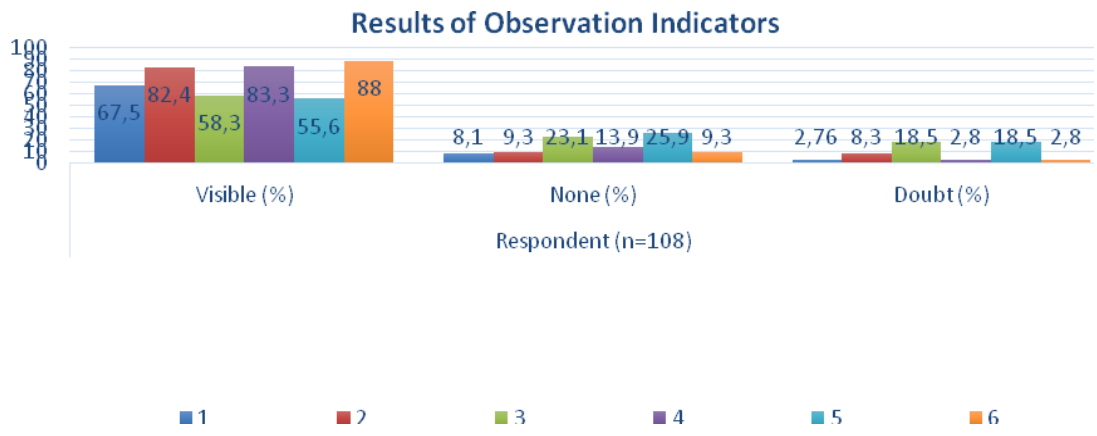
Results

Analysis of Student Responses to the Application of HOTS-based SEW

Our study's results include some aspects based on the focus research question consisting of problem analysis, including the practical application of SEW-based HOTS, analysis of student responses to the application of SEW in the classroom, and how technology helps motivate students to use HOTS. Observations on the application of HOTS-based SEW in the classroom are as follows:

Figure 4

Results of Observation Indicators

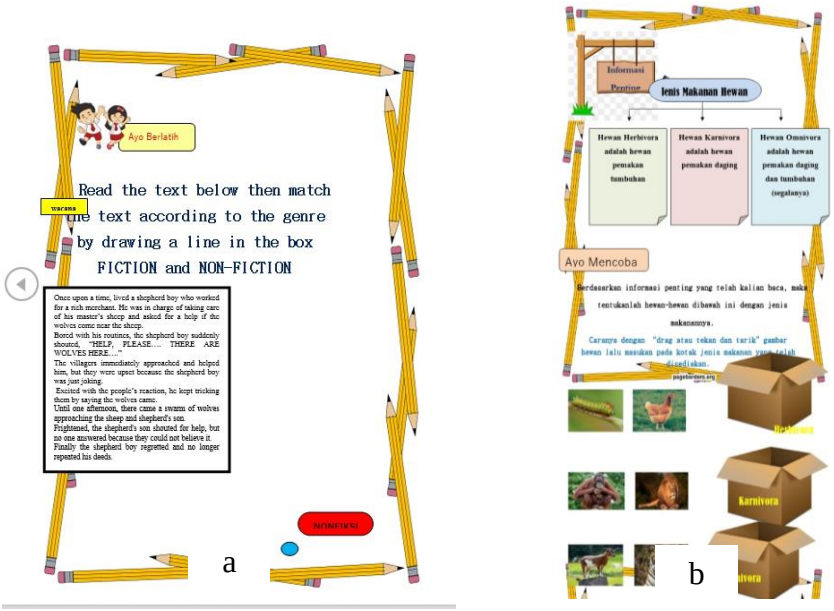


The following is an example of a form of SEW that researchers developed and conducted in this study by working on the fifth-grade students. The data above were collected through observation with a three-point differential semantic scale, visible -doubt - invisible/none (Margono, 2013). From the observed results above, 88% of students used and applied HOTS-based electronic worksheets well. Moreover, using this technology could attract the attention and motivation of

students learning as much as 82.4% of the 108 students observed.

Figure 5

Part of the Hard-file of SEW Design



Source: Personal documents of the results researcher's SEW, a) English version; b) Indonesian version.

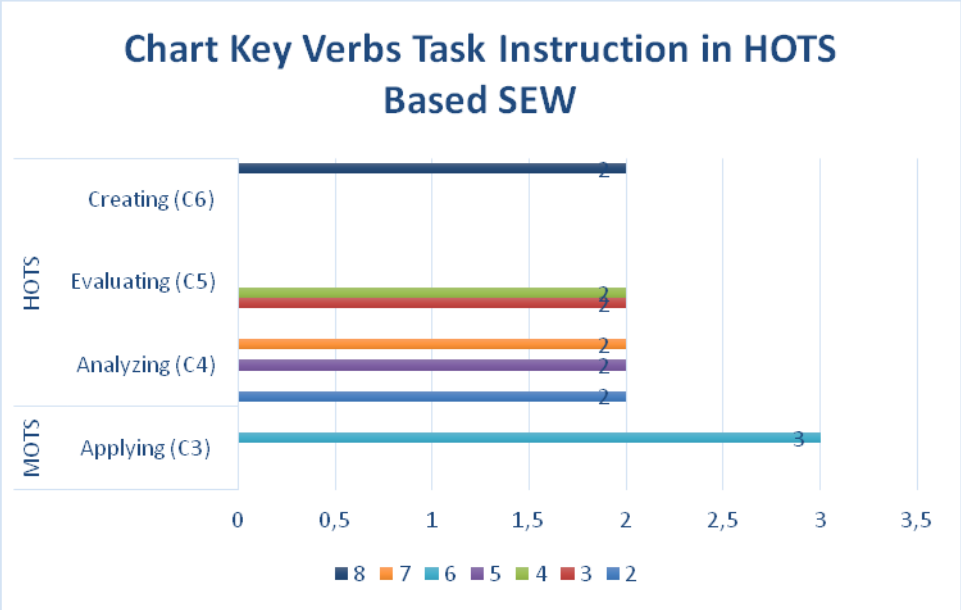
In addition to the above, our observations in general, the results of class observations related to the implementation of SEW in the classroom, and problems in the application of SEW arising in online learning include the limitations of electronic devices to fill or work on SEW. No interaction exists between educators and students during learning, so when students cannot understand the questions asked by the teacher, they cannot immediately answer. Moreover, the teacher can only assess the results because no visible attitude of students exists in the implementation. Not all parents of students can concentrate on learning activities, even though students still have to be accompanied because the learning is conducted online. The teacher cannot observe the activities of students in doing SEW. Therefore, follow-up is needed in synchronous and asynchronous learning. The problem of an unstable signal also highly affects the learning with SEW.

Observations were made during the 2x pre-use of SEW and when using SEW research. While participating in 2x observations in class, teachers used PowerPoint media with the theme of the material. It was underway and related to environmental and ecosystem themes, although the assignment was performed through SEW. However, the researchers concluded that selecting materials, learning methods, and worksheets must be appropriate following class conditions and the characteristics of their students.

The process of using SEW provides innovations in improving students' cognitive competence. It can be seen based on the instruction words in the HOTS-based SEW used in one of the following learning themes, with many instruction words (n=15) in each sub-theme of the worksheet, the details follow.

Figure 6

Use of HOTS Through Instruction Verbs in SEW



From the one worksheet of HOTS-based SEW which we analyzed, it is not that the applying verb contained in the cognitive MOTS level is the 3x instructions, all three of which use the instruction word "Let's Try it," but in the analyzing category there are as many as three kinds of instruction words used, namely, "Analyze the Pattern, Checking or peer review, and Let's Practice." Although it uses different instructions, it has the same analysis category, and students show promising results in applying HOTS-based SEW, as in the following Table:

Table 3

Student Task Results of HOTS-based SEW

Level Cognitive	Item	Student responses in assignments			Percentage Correct (%)	average (%)
		Correct	Incorrect	doubt		
C3	1	78	27	3	72,2	69,1
	2	83	23	2	76,9	
	3	63	42	3	58,3	
C4	4	79	24	5	73,1	74,1
	5	80	25	3	74,1	
	6	87	17	4	80,6	
	7	85	21	2	78,7	
	8	74	30	4	68,5	
	9	75	27	6	69,4	
C5	10	90	15	3	83,3	83,8
	11	89	12	7	82,4	
	12	87	17	4	80,6	
	13	96	9	3	88,9	
C6	14	95	11	2	88,0	78,7

15	75	26	7	69,4

The cognitive level of evaluation (C5) in the picture above has the highest average of 83.8%, so HOTS-based SEW can direct students to consider forming new ideas that reconstruct previous thoughts. In addition, the creation process also occupies the next highest value of 78.7%. In the context of HOTS-based SEW, the process of creating is executed through the instruction "Create an idea." However, there are still students hesitant to do this task, which needs to be studied further.

Analysis of Teacher Responses to the Application of HOTS-TPACK-based SEW

Based on the results of the interviews with six elementary school teachers, several questions contained in a series of content analyses of the TPACK abilities of State Elementary School 19 of Rambang Niru teachers can be summarized as follows:

Table 4

Results of TPACK for Elementary School Teachers

No.	Component	Indicator	Assessment criteria
1	Technological Knowledge	Able to teach students by using different websites (e.g., *YouTube, WAG, Zoom*)	Enough
		Have technical skills in utilizing technology	Enough
		Able to master technology easily	Enough
		Able to combine learning with the use of the internet for students	Enough
		Able to use software conferencing (e.g., MSN, Messenger, Skype, Yahoo, IM)	Enough
2	Pedagogical Knowledge	Able to direct students to learn independently	Good
		Able to design group activities for students	Good
		Able to select learning themes that are suitable for group activities	Good
		Able to educate children to be able to monitor learning achievement independently	Enough
		Able to educate students to choose the appropriate learning strategy	Enough
3	Content Knowledge	Have strategies to improve understanding in the field of study taught	Good
		Have varied ways to improve self-understanding on subsequent learning topics	Enough
		Able to focus on the subject matter such as an expert who focuses on his teaching subject	Good
		Have adequate mastery of the subjects taught	Good
4	Technological content knowledge	Able to utilize the right technology in accordance with the content of the field of study	Enough
		Able to select the content of basic competencies appropriate in teaching using technological means	Enough
		Carry out learning activities with other technological media such as laptops, LCD projectors, pointers.	Enough
		Able to understand the content of teaching that uses technology facilities so that students can easily master the lesson	Enough

5	Pedagogical content knowledge	Able to assess the process and learning outcomes of students	Good
		Able to develop curriculum, syllabus, and other learning tools	Good
		Designing learning activities	Good
		Do educational and communicative teaching	Good
6	Technological pedagogical knowledge	Able to think about the influence of technology on teaching approaches used in the classroom	Good
		Able to think critically about how to use technology to students	Enough
		Able to choose the use of different technologies for different learning activities	Enough
		Able to use information and communication technology for student group discussion activities	Good
7	Technological pedagogical content knowledge	Able to utilize strategies that combine material content, technology, and teaching techniques	Enough
		Able to help students and peers to apply the use of technology, materials, and teaching approaches in schools	Enough
		Able to select the use of technology in the classroom in an effort to improve the learning process of students	Enough
		Able to provide lessons that match the combination of fields of study, technology, and teaching techniques	Enough
		Able to utilize technology in teaching certain material units to students	Good

The assessment and scoring conversion criteria are presented in Table 4 (Syahputra, 2020):

Table 5

Conversion of Scores and Assessment Criteria

Interval	Criteria
96–100	Very good
86–95	Good
76–85	Enough
56–75	Poor
0–55	Bad

Table 4 shows seven components of TPACK containing HOTS, and researchers analyzed six teachers. Each TPACK indicator has an explanation and description of activities analyzed for six teachers of SD Rambang Niru whom we interviewed and observed. The most critical observations are:

1. Technological knowledge (TK) of the teachers of the school under consideration on average is in the “enough” category. It can be seen from the teacher's ability to use applications such as Zoom and WhatsApp groups and access videos from YouTube in the learning that has been done, even though these teachers have only mastered basic skills. Thus, it can be interpreted that the level of technological ability of the teachers of this school is still unsatisfactory. This score further proves that the teachers’ ability concerning the “use of technology” still needs to be developed and improved for the future. Yanuarto et al., (2020) emphasized that this dimension of TK can be measured by using the level of mastery of information technology and the level of adaptability of teachers to new information technology. Based on the assessment of this study, teachers are considered “enough” capable of mastering new information technology in learning to students. Here is the result of an interview with a grade 5 teacher who stated:

Teacher: "Because of this Covid, it forced us to adapt to learning applications, back when

> we first used WhatsApp groups only, but now we use learning management systems from the Ministry of Education, Culture, and Technology with the belajar.id application, and it can increase our ability even though we are still learning to use it" (NS, Female, Grade 5 teacher).

2. Content knowledge (CK) of the school teachers under consideration has been included in the "good" assessment category. It covers the ability to focus on the subject, such as an expert focusing on his teaching subject. Thus, it can be interpreted that the teachers' level of mastery and teaching materials are satisfactory. It aligns with the assumption of Rahayu (2019), who explained that this dimension is measured by the level of mastery of the teachers regarding the subject matter. In summary, teachers can master the content of teaching materials taught to students.

3. The pedagogical knowledge (PK) of the teachers of this school has also been categorized as "good," directing students to learn independently, designing group activities for students, and selecting learning themes suitable for group activities. It is by the teacher's question regarding thematic learning in SEW:

> Teacher: "The SEW assigned to a student already contains thematic learning per government regulations so that this SEW can be done immediately and strongly supports our pedagogical knowledge because this SEW begins with an explanation of the lesson plan and learning objectives first" (SF, Male, sixth-grade teacher).

Per Rosyid's (2017) findings, teachers can readily apply their pedagogical abilities in learning activities. They can use teaching materials well, aligning with learning objectives and learning media that support students' achievement. Thus, it can be interpreted that the teachers' level of pedagogical knowledge is satisfactory.

4. Technological content knowledge (TCK) teachers of the school under consideration, on average, is only in the "enough" assessment category. According to Rahayu (2019), teachers can be in the "adequate" category in presenting teaching materials through technology. Thus, it can be concluded that the technological ability of the teachers to deliver learning materials is still not satisfactory.

5. This school's technological pedagogical knowledge (TPK) is also in the "good" assessment category. Hence, one can conclude that the level of pedagogical competence of the teachers regarding technology is relatively satisfactory. Rosyid argued that as the fifth component variable of TPACK, the ability of teachers to teach using communication technology is included in the "good" category, meaning that the application of technology in teacher pedagogy skills is highly relevant but has not been developed and appropriately improved.

6. The level of pedagogical knowledge or pedagogical content knowledge (PCK) of the teachers of this school is considered "good." Rahayu (2019) explained that teachers have been competent in mastering teaching strategies and techniques per the content and appropriate subject topics so that the competence of teachers in this aspect can be stated as "good." Thus, one can conclude that the level of teacher pedagogical competence related to the teacher's

presentation of content and learning materials is satisfactory.

7. TPACK of teachers of the school under consideration is in the "enough" assessment category. It helps students and peers to apply the use of technology, materials, and teaching approaches in schools, utilize strategies that combine material content, technology, and teaching techniques, and select the use of technology in the classroom to improve the students' learning process. Thus, it can be deduced that the TPACK qualifications for the teachers are still unsatisfactory and need to be developed, and they must be trained to improve according to the current demands.

According to Sum (2020), elementary school teachers are the key to the success of early childhood education and learning activities. With the development of an increasingly rapid and modern era, accompanied by various technologies, teachers must adjust their quality to develop their skills, expertise, and knowledge. Literature pertinent to teaching, technology, and teaching strategies can attract students' interest in learning. In today's complex era, a teacher can be called a professional educator by studying technology well for educational activities. Sumantri et al. (2022) reported that they can adopt the use of technology at various levels of elementary school. Learning materials can be delivered using technological devices, one of which is through the SEW. It is not only to familiarize children with technological gadgets but also to ensure that students can increase their critical and creative thinking skills.

One can see the results of students' responses to the teacher's teaching style by using HOTS Based SEW, as depicted in the following image:

Figure 7

Student Response Regarding Teachers' Teaching Style

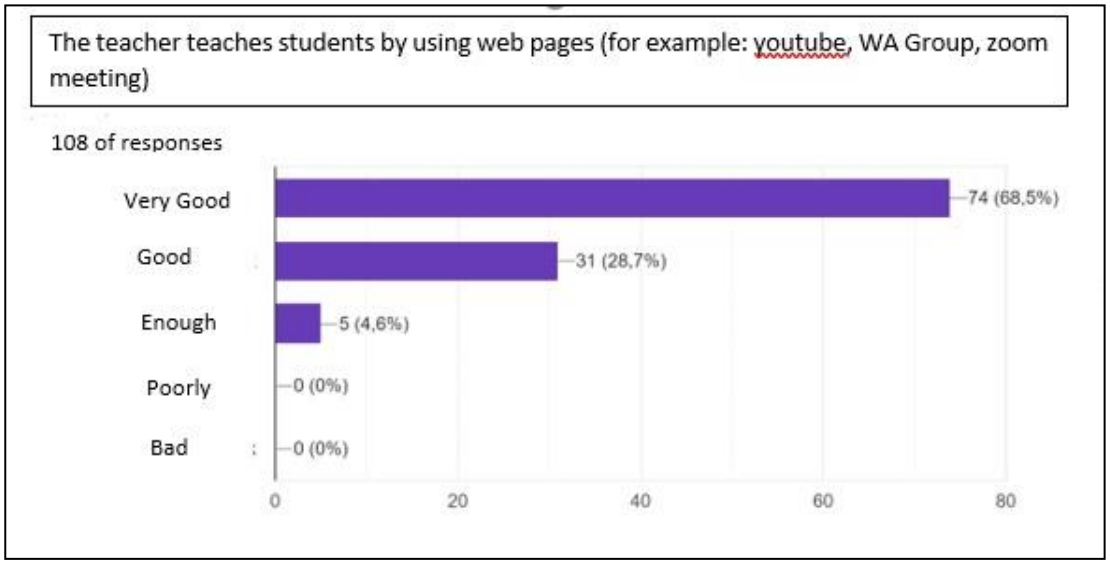


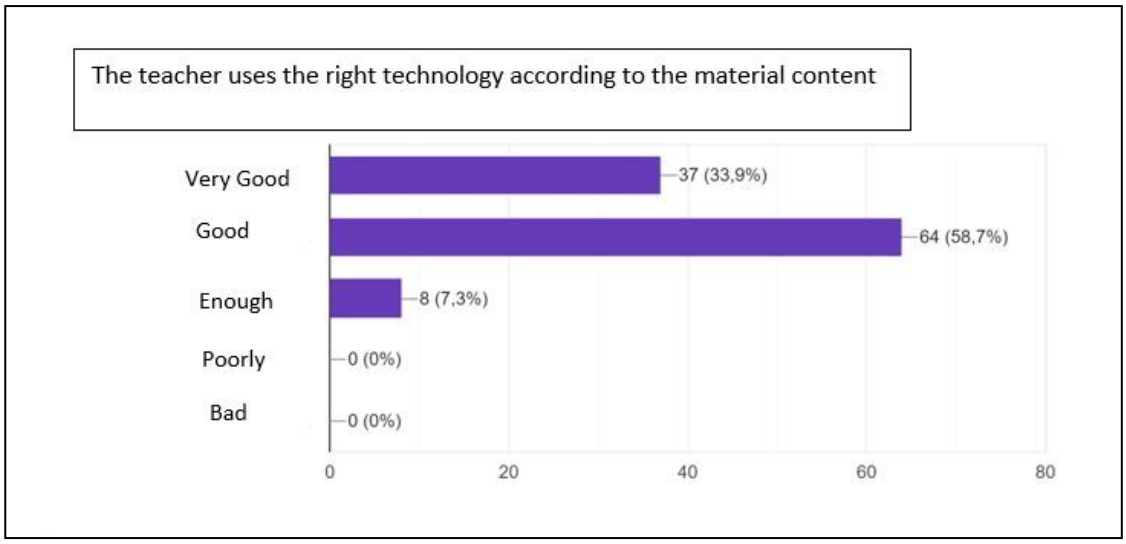
Figure 7 (response from 108 students) illustrates that 68.5% of students responded very well to the teaching style of teachers who use online webpages, and based on the results of interviews with students, most teachers use WhatsApp groups in distributing SEW. As in the following statement:

Student R: "My teachers usually use WhatsApp groups when asking us to do tasks but rarely use google meet."

In addition to the findings, students also responded to the use of technology per the content of healthy food sub-theme materials in the fifth grade of this elementary school, as follows (see Figure 8):

Figure 8

Student Response Regarding the Conformity of Technology with the Material



A total of 64 students gave a "good" response to teachers regarding the suitability of technology utilization with the content of the material provided, that is, in the sub-theme of healthy food proven through the use of learning videos with YouTube media.

Discussion

SEW based on HOTS by taking the context of TPACK is an innovation of student worksheets on theme three; one of the learnings explains that food has three advantages. (1) Contextual and relevant to current environmental issues related to the scarcity of cooking oil. (2) HOTS-based, (3) TPACK, and (4) for elementary school level. This advantage has the potential that SEW can improve the quality of learning, especially for elementary school children in the 21st century, known as the ability to think critically and creatively, which is also in line with the results of Subur's (2021) research. However, in this case, it is different because the researcher developed herself with a simpler context for the background of students far from big cities.

Based on Table 3 (see Table 3) on the student cognitive level chart, it can be seen that the cognitive level of evaluation (C5) in the picture above has the highest average value of 83.8%. In addition, the creation process also occupies the next highest value of 78.7%. In the context of HOTS-based SEW, the process of creating is executed through the instruction "Create idea." It is evidenced by the learning outcomes that provide verbs according to the HOTS keywords, as

stated in bloom's taxonomy table (see Table 1), so that HOTS-based SEW can direct students to consider forming new ideas and reconstruct previous thoughts (Ichsan et al., 2019b). Analyzing has also looked good at the cognitive level because teachers with good content knowledge teach students.

The SEW-based HOTS that corresponds to the TPACK approach is implemented in the form of questions (see Figure 2) by involving six cognitive aspects of remembering, understanding, applying, analyzing, evaluating, and creating those given to 108 students. The level of remembering - applying (C1–C3) is categorized as low-level thinking ability or LOTS, while the level of analysis - creating (C4–C6) is categorized as higher-level thinking ability or HOTS (Abduljabbar, 2015). The questioning was conducted after hybrid learning, with some students through online learning and some through face-to-face (related to regional restrictions due to Covid 19). For online purposes, teachers use the SEW that researchers have designed. This learning model aims to overcome learning loss due to the COVID-19 pandemic in Indonesia and improve critical thinking and debating skills (as one of the indicators in HOTS).

SEW is different from other online learning (Alhrahsheh & Ivanova, 2022; Ghafur, 2021) because it is a student worksheet based on HOTS and has six learnings centered on one theme, that is, ecosystem. Moreover, previously developed worksheets are more general and not yet HOTS-based (Ichsan et al., 2019a). Another advantage of HOTS-based SEW is that it is more contextual and relevant. SEW-based HOTS is a learning tool that can facilitate students, especially in the countryside, with more depth and prioritize discussion with peers.

SEW-based HOTS with the TPACK approach is a skill that teachers, even elementary school teachers, must possess because they support the teaching profession in the recent era known as the digital reform. It has already been averred by Nasution & Nurhafizah (2019), who explained that the world of education is now closely related to the digital era. It means that all educational activities must be adapted to technological developments. Likewise, teachers' competencies must reflect the knowledge and abilities to apply technology in learning activities because children today are primarily familiar with technology. With the introduction of children to technology devices and technology-based communication media, the world of education is also required to keep up with developing technology. Elementary school teachers are also required to master the skills and the ability to adapt technology as a learning challenge in this digital era and to change the way of educating and teaching by utilizing information and communication technology as a more sophisticated facility for learning activities.

Learning materials can be delivered using technological devices, like a laptop or computer. Therefore, professional teachers play a vital role in adopting, implementing, and using technology in teaching and learning activities. It is to familiarize children with technological gadgets and ensure that children do not stutter, as it is a modern developmental necessity.

This study has two implications. First, HOTS inevitably appears as the means of critical thinking in the digital teaching system. Second, the use of SEW a teaching instrument that adapts technology and HOTS is recently a core teaching model to accommodate technology. Consequently, this study promotes its novelty in that critical thinking appears in the profile of SEW where technology-based teaching model through TPACK is applicable.

Conclusion

As for the conclusion, the teaching style of elementary school teachers must keep up with the times. Technology only functions as a support and media in educational activities. Improving HOTS in the digital teaching materials has been well accommodated using TPACK. Accordingly, HOTS that is based on Bloom taxonomy is applicable to integrate into technology knowledge where digital teaching platform is dominant in the covid-19 pandemic era. TPACK is one of the frameworks that can be applied to bridge learning losses in extraordinary times; for example, during this pandemic, using electronic student worksheets can improve students' abilities and develop their resourcefulness so that they possess high levels of thinking and other essential skills required in the Industrial Era 4.0. To achieve these opportunities, every teacher or student must adapt well and quickly through the integration of SEW based on HOTS.

This study is limited in terms of the elaboration of HOTS in the SEW and the exploration of quantitative data analysis. However, the results of the use of SEW to apply HOTS is effective. It is suggested that students' HOTS abilities can undoubtedly be improved in various ways. One is that teachers can present an interesting SEW because it will impact more active learning. The activeness of students working on SEW provides opportunities for increasing HOTS following 21st-century learning. In addition, quantitative data analysis can be expanded into inferential statistics applying an experimental study.

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