Leveraging Educational Technology (Hyperdocs) On Student's Collaboration Skills

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Abstract. This study aims to develop practical and effective student worksheets based on Hyperdocs on the collaboration skills of fifth-grade elementary school students in science learning. The development applied an instructional design that was performed in the semester of the 2020/2021 school year involving 28 students (13 male and 15 female). Data collection techniques include a pretest/posttest (10 questions of multiple choice), observation of student and teacher activities, and a questionnaire for students' collaboration skills. The indicators of collaboration skills were contributing actively, working productively, showing flexibility and compromise, managing projects well, showing respect, and showing responsibility. The results showed that the expert assessment of the student's worksheet Hyperdocs-based was 75% with valid criteria, the expert assessment of the practicality of 93.75% in the valid category, the results of the expert assessment on the student response questionnaire the average acquisition of 94.17 valid categories. The developed Hyperdocs-based worksheets have practical values in implementing learning at meetings 1 and 2 of 88.16% and 87.50% with very practical criteria. The student's worksheet Hyperdocs-based development was effective in science learning which was 0.78 with high criteria.

Keyword: hyperdocs, collaboration, communication

1. Introduction

Technological education is essential to achieve education for sustainability development (ESD) [1,2]. Science learning as a process includes the process skills of observing, asking questions, collecting data, associating, communicating, predicting, and concluding [3,4]. Based on the observations of science learning in primary school at Palu and other research, the teacher places more emphasis on cognitive aspects than other aspects such as collaboration skills [5,6]. Students' collaboration skills are still inexperienced which is indicated by the absence of a clear division of tasks when working together in groups and a lack of respect among group members [7,8]. In addition, the delivery of material that is less effective causes students to get bored quickly, tend to be passive, and do not fully understand the learning material [9]. This transpires because students are only given memory strengthening, not critical understanding and discovery of ideas, making notes in a monotonous form, or working on questions in student books [10].

Teaching materials such as textbooks and worksheets in the science learning process have an important role because the lack of clarity in the material presented can be

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helped by presenting teaching materials as intermediaries [11]. The use of teaching materials also affects the effective allocation of time during the implementation of learning. Printed teaching materials are teaching materials that have been used to overcome the lack of time allocation [12].

The existing student worksheets are not the result of the educator's own development, so educators are sometimes difficult to determine which books are suitable for use in learning and are easily understood by students. The development of teaching materials by educators is one of the important factors in the learning process because educators know more about the character of students.

One of the interactive teaching materials that can be used as media support is Hyperdocs-based worksheets. Hyperdocs is a digital literacy application that was popularized by Kelly Hilton, Lisa Highfill, and Sarah Landis in November 2017, they were dubbed Hyperdoc girls [13]. They explain that Hyperdocs are actually lesson plans that move learning away from encouraging students to provide opinions, choices or opportunities for investigation, exploration, critical thinking, collaboration, and creativity. Hyperdocs, a transformative and interactive Google Doc replacing the worksheet method of delivering instruction, is a key change agent in mixed learning classrooms

Hyperdoc is a digital document, a set of multimedia texts for students consisting of links to visuals, audio, informational texts, narrative texts, online educational activities, and more [14]. Hyperdocs-based worksheets have the potential to change the way teachers teach with technology. It's not about teaching technology, it's about using technology to teach. This concept has spread throughout EdTech (which is one of the start-ups in the field of education). The demands of the 2013 Curriculum, which is the necessary, the application of teaching materials, such as worksheets based on Hyperdocs and integrated in technology and digital concepts, can be developed and applied systematically in schools. With HyperDocs, students can access wider information about learning provided by teachers. Learners can work together with other students to complete tasks and instructions from the teacher and students can also provide information about the knowledge that students get to other students [15].

This paper is intended to describe the development of Hyperdocs-based student worksheets on the collaboration skills of fifth grade elementary school students in science learning.

2. Method

This model of research and development was based on Thiagarajan [16]. The research was carried out by collecting information related to the science learning process through teacher interviews and field studies. A total of 28 primary student from year five participated in this study. The students were aged 10 - 11 (M = 10.4; SD = .73). The characteristics observed were the skills of students, especially collaboration skills which were observed through observation sheets; task analysis- to determine the main competencies that will be achieved by students with reference to the 2013 Curriculum. In this study, task analysis was carried out by identifying main competencies (MC) and basic competencies (BC), indicators of competency achievement, learning methods, and subject matter; concept analysis to identify the concepts to be taught in the developed science worksheets and to identify other concepts that are relevant to the main concepts so that they will form a learning concept map; formulation of learning objectives as the basis for designing learning activities in the science students worksheet and compiling learning tools.

2.1 Hyperdocs development

a) Design stage

The essence of the design stage is to prepare an initial draft of Hyperdocs-based worksheets based on the data obtained at the definition stage. At this stage, there are three activities which are described as follows: (i) developing research instruments used to assess the feasibility of Hyperdocs-based worksheets, measure students' responses to Hyperdocs-based worksheets, and measure collaboration skills. Therefore, the instruments compiled in this study include a Hyperdocs-based worksheet validation questionnaire, student response questionnaires. on Hyperdocs-based worksheets, collaboration skills observation sheets; (ii) media selection is based on task analysis, concept analysis, and student analysis. The selected media is expected to support the achievement of competence and increase collaboration skills optimally in science learning; (iii) Format selection of the students worksheet Hyperdocs-based format refers to the Hyperdocs-based grid to improve collaboration skills. The students worksheet Hyperdocs-based format that was developed in accordance with the general students worksheet format consists of:

1) The title of the Students Worksheet Hyperdocs-based developed was Heat Transfer Student Worksheet for Class V Semester II with Hyperdocs Application.
2) The study guide contains materials that will be discussed in Hyperdocs-based worksheets.
3) The competencies to be achieved are in accordance with the basic competencies of science class V semester II on Theme 6 Heat and its Transfer.

b) Development stage

This stage produces a revised Hyperdocs-based worksheet based on input from experts (expert lecturers including media experts and material experts). From the revision results, a Hyperdocs-based worksheet will be obtained which is ready to be stored in a Google Docs.

c) Dissemination stage

This stage was the stage of using student worksheet Hyperdocs-based products that are distributed using the Google Classroom web application. The scenario of the trial implementation was to implement the One Group Pretest-Postest Design [17]. The research subjects were students of SDN 15 Palu grade V totaling 28 students, consisting of 13 male and 15 female. HyperDoc-based worksheets are teaching media that are uniquely and attractively designed in the form of teaching materials that have been packaged in such a way that students can study the teaching materials independently and allow students interested in participating in learning without the teacher not needing to be a technology wizard to create an interesting layered learning experience. layers for their students [18]. Students can access lessons and work at their own pace.

Collaborative ability was a person's ability to work together in small groups to achieve learning goals which are manifested in the form of social interaction [19].

2.2 Data collection technique

Data on learning outcomes were taken from the results of the pretest and posttest with the test method to determine the improvement of students' collaboration skills and to compare the average scores.

Questionnaire technique was performed by distributing a survey to students which aims to measure students' collaboration skills. The questionnaire uses the results of the indicators of collaboration skills, namely 1) contributing actively, 2) working productively, 3) showing flexibility and compromise, 4) managing projects well, 5) showing respect, and 6) showing responsibility.

The research instruments used were written tests, observation sheets, rubrics for assessing student collaboration skills, and Hyperdocs-based Student Worksheets. Observation of the implementation of worksheet in the learning process was carried out in four meetings in year V. The written test instrument is in the form of questions based on the material being taught, while the observation sheet is to measure students' collaboration skills to ensure the data obtained by the researcher.

The Student Worksheet Hyperdocs-based validation data is obtained from the validation results by the lecturer with the validation sheet instrument, and then it can be analyzed using the formula [20]:

3. Results and Discussion

The development of hyperdocs-based worksheets has similarities in several components of ordinary worksheets such as: titles, basic competencies, learning objectives, formulating problems, hypotheses, tools and materials, experimental steps, tables of observations, data analysis, and conclusions. Student worksheet is usually in the form of teaching materials from printed sheets.

The topics of the student worksheet developed was "Heat Transfer" including heat transfer by induction, convection, and radiation, in which the competencies to be achieved are in accordance with the basic competencies of science year five that is applying the concept of heat transfer in daily life and report observations about heat transfer. Validation process for the student worksheet, cognitive test and questionnaire by experts can be seen in Table 1-3.

Table 1 Validator assessment results on aspects of hyperdocs-based worksheets

No	Rated aspect	Average Rating	Criteria
1	Contents	75%	Valid
2	Language	75%	Valid
3	Display	75%	Valid
Average		75%	Valid

Table 2 Validator assessment results on learning implementation question 1 and 2

No	Rated aspect	Question1	Question 2
1	Destination	100/valid	100/Valid
2	Activities and learning atmosphere	91.6/valid	91.67%/Valid
3	Language	91.6/valid	91.6/Valid
Average		93.75/valid	93.75/Valid

Table 3 Results of expert assessment of student response questionnaires

No	Rated aspect	Average Rating	Criteria
1	Concept	87.5%	Valid
2	Construction	100%	Valid
3	Language	95%	Valid
Average		94.17%	Valid

Student worksheet in the form of HyperDocs-based were declared very valid with an average of 75%. The questionnaire on the implementation of learning at meetings 1 and 2 was stated to be very valid with an average of 93.75% (Table 2), and the student response

questionnaire was stated to be very valid with an average of 94.17% (Table 3). This shows that the learning materials were feasible to use according to the criteria used. The tools was considered valid if a validity value of 61% is obtained [19].

Cognitive tests of students were observed by giving a test in the form of a description of 10 numbers and given at the first (beginning) and fourth (final) meetings, before and after all the Hot material and its changes were presented. The data on the percentage of students' passing in the post test is 89%. While in the pre-test the percentage of completeness of the control class students was 76%. using the google form application, making it easier for researchers to analyse student learning outcomes.

Affective tests of students were observed using an observation sheet during the learning process using the Google Meet application, with the acquisition of 84.4%. Psychomotor/performance tests by students were observed using observation sheets when students conducted experiments during the learning process. The indicators observed are indicators of student collaboration skills with the acquisition of 80%.

The analysis of the learning implementation questionnaire assessed by the observer obtained an average percentage for meeting 1, namely 88.16% and 87.50% with very practical criteria and the student response questionnaire that had been filled in by the students obtained an average percentage, namely 81.11% with very practical criteria. This shows that the learning device is feasible to use according to the criteria used. The device is considered very practical if a practical value of 61% is obtained [21]. Santi & Santoso [21] the results of student assessment of the student worksheet show that the developed student worksheet has met the practical criteria. The practicality of the device is also supported by the implementation of learning which has exceeded 80%; Hyperdoc-based worksheets are a mixed learning platform for the scope of education that can make it easier for teachers to create, share and classify each paperless assignment [22].

The product trial involved 1 experimental class, namely class 5A which consisted of 28 students. Observation of the implementation of LKS in the learning process was carried out in four meetings in class VA 1st week, 2nd, 3rd, and 4th using Google Meet. Pretest questions are given to students before learning which aims to determine students' initial abilities before treatment and then provide treatment in the form of Hyperdocs-based worksheets and provide posttests to students after learning which aims to determine the effectiveness of the use of the products used on students' collaborative skills. Furthermore, students fill out the questionnaire given after testing the developed product.

Table 4 Practical results of the student worksheet hyperdoc-based feasibility questionnaire in the learning process meeting 1 and 2.

No	Rated aspect	Average Rating		Criteria
		1	2	
1	Destination	95.83%	85%	Very Practical
2	Activities and learning atmosphere	83.33%	86.11%	Very Practical
3	Language	87.50%	91.67%	Very Practical
Average		88.16%	87.50%	

Data analysis of the effectiveness of learning media the Cohen size effect [23] score of students' collaborative skills on 13 students is in the large criteria and 15 students are in the medium criteria. The Cohen size effect score of individual students' collaborative skills on average is 0.78, which is in the medium criteria.

The basic difference between ordinary worksheets and hyperdoc-based worksheets is that hyperdoc-based worksheets work using a network, contain messages that are not printed, cannot be used spontaneously but require a learning design that combines technology effectively. In line with Munir [19] stated, the development of information and communication technology has changed data in printed form into digital materials that can be viewed on a monitor screen and can then be printed out. Learners do not have to be present in the classroom to do the activities in the student worksheet, but it is enough to just sit from their respective places in front of the computer (of course using a computer equipped with a connection facility for digital learning) and use it as well as a component in the form of a link.

Hyperdoc-based worksheets facilitate students to learn more broadly, more, and varied. Students can learn anytime and anywhere without being limited by distance, space and time. The learning materials studied are more varied, not only in verbal form, but more varied such as text, visuals, audio, and motion that can be accessed through the facilities provided in the form of a link component and also can create a learning atmosphere that provides alternative learning strategies that are innovative, constructive, and student-centered, with a focus on achieving the expected competencies. It takes place interactively, inspiring, fun, challenging, motivating students to participate actively, and providing sufficient space for initiative, creativity, and independence in accordance with the talents, interests, and physical and psychological development of students.

Collaborative learning puts forward social closeness that can develop students' knowledge and understanding [24]. Akyol & Garrison [25] stated that student collaboration in both online and blended learning can improve learning outcomes. In an online learning environment, these interactions can increase learning motivation, learning commitment and skills to cooperate and collaborate among students [26]. Interaction between students in online classes can help to increase their motivation so that they are more committed to learning, which in turn can improve student learning outcomes [27]. Student worksheet Hyperdoc-based learning in elementary schools is aimed at students who are already in high grade. High-grade students have concrete, practical, everyday life interests. Students at that age are technologically literate, ready to accept the times through existing technology. Collaborative skills are a skill that must be possessed by students so that they are not left behind in the progress of the times and current education [10].

4. Conclusion

The student worksheet Hyperdoc-based developed can improve students' collaborative skills based on the results of the pretest 36.07, posttest 76.64 showing that the posttest value is higher than the pretest value and the average value of the Cohen size effect obtained is 0.78 with high criteria.

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