Digital storytelling based on natural environment exploration to improve the mastery of classification concepts

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Abstract. This article aimed to discussing the use of Digital Storytelling in enhancing students' concept mastery. This study employed a literature review, while the researchers obtained the data from a variety of sources which were reduced afterward. The research results revealed that there were four implementation stages of the activities in Digital Storytelling-based learning with Natural Environment Exploration approach. The lesson activities assisted the students to comprehend the concepts since the learning emphasized on scientific facts. Therefore, these activities could help the learners having diverse visions, studying various concepts, and linking them directly to the real life which made the learning contextual. It concluded that the Digital Storytelling-based learning with Natural Environment Exploration approach could improve the students' concept mastery on the Classification topic.

1. Introduction

The education system implemented through the 2013 Curriculum is a guide for teachers on the classroom learning activities. The implementation of the 2013 Curriculum provides opportunities for learners to actively seek, process, construct, and use the obtained knowledge, therefore that learners will be further enhanced [1]. The implementation of the 2013 Curriculum also requires the development of technology in improving the quality of human resources to compete in nowadays digital age. The learning process should integrate the use of technology, information, and communication (ICT), nevertheless, the ICT in the learning process is away from optimal usage. Most teachers benefit ICT merely to send a task, find references, and use instructional media such as PowerPoint and Flash [2]. In addition, referring to the 2013 Curriculum, learning activities should be based on the scientific approach, which means that the learning must comprise scientific activities. Such activities are as an overview of a certain natural phenomenon for the students to be able to understand and reconstruct it. It is expected that the knowledge reconstruction would result in the students gaining facts, principles, theories, and laws relating to the phenomenon being discussed [3].

In some regions of Indonesia, the lecturing method is mostly used in learnings, just as in Ponorogo [26]. In fact, the teaching method oriented to the knowledge transferring by teachers or so-called the lecturing method only results in not more than 5% of the students comprehend the materials [27]. One of the topics concerning more on memorization in Science Subject is the Classification of Objects and

Living Things. Found that the students at SMP Negeri 1 Wonosobo Indonesia had their average score class on the Classification of Living Things topic fell under the mastery learning criteria particularly 55.03 [5]. Among 28 students in a class, there was only 1 student scored above the mastery learning criteria. Furthermore, the students in Junior High School 3 in Petrongan Jombang considered the animal classification topic as hard since many creative content and learners rely on books as the main source [6]. Textbooks also remain a major source of learning for students in SMP Negeri 1 Petanahan Indonesia in learning the classification of living things materials. Instead of exploring their surrounding they had the teacher-centered learning which caused 60% classical completeness.

In fact, there are various learning models that could be applied in learning activities with the scientific approach mainly on the science learning process. The science learning should concern more about the students' direct experience and opportunities. One of the approaches suitable for this matter is the Natural Roaming Around (JAS) approach [8]. According to [9], who developed a suit-based module, elucidated that this approach has hiked up the adoption of current phenomena occurred in the surrounding as a learning source. Referring to the [10], the use of Natural Roaming Around (JAS) approach provided a positive effect on the improvement of students' learning outcome and character education. Moreover, [11] has proven that applying the Natural Roaming Around (JAS) approach strongly influenced students' comprehension of the scientific approach. In addition, [12] who conducted a research on the Natural Roaming Around (JAS) approach using a photo-voice, found that it had a favorable impact on science learning at Junior High School 12 in Denpasar Indonesia.

Learning to present scientific approach cannot be separated with the use of technology. This statement is in line with the explanation of [13] that the 21st-century education needs to ensure learners to be able to combine knowledge with technology. In 2017, [28] described the research results on the teacher at Junior High School 2 in Boja Indonesia which turned out that the use of media-based technology has not been implemented; instead, they employed the printed form media. Actually, the use of technology cannot be separated from the learning activities, one way to use technology to support learning in the material classification is using the Digital Storytelling technology of Storytelling video created by learners.

The use of Digital Storytelling in learning science is also able to improve the learners' metacognitive skills [14]. Metacognitive skill is the highest ability of a person to regulate and inspect his/her thinking [15]. Metacognitive skills influence the intelligence level of learners because it enables the learners to overcome the difficulties of learning they had [16]. In addition, the study [17] showed that the use of Digital Storytelling used in learning activities could improve the students' learning outcomes and support the learning process. The research by [17] also revealed that an increase in post-test results of the students after being taught using the Digital Storytelling. With this in mind, this article aimed at examining the use of Digital Storytelling in enhancing the students' ability to understand the concepts of classification.

2. Research Methods

This research is literature review referring that having the six stages as follows: (1) formulating the research question(s) and objective(s); (2) searching the extant literature; (3) screening for inclusion; (4) assessing the quality of primary studies; (5) extracting data, and (6) analyzing data [18].

As a first step, the researchers must appropriately justify the need for the review itself, identify the review's main objective(s), and define the concepts or variables at the heart of their synthesis. The next step consists of searching the literature and making decisions about the suitability of material to be considered in the review. The following step consists of evaluating the applicability of the material identified in the preceding step. In addition to screening material for inclusion, the researchers need to assess the scientific quality of the selected studies, that is, appraise the rigour of the research design and methods. The following step involves gathering or extracting applicable information from each primary study included in the sample and deciding what is relevant to the problem of interest. As a final step, the researchers collate, summarize, aggregate, organize, and compare the evidence extracted from the included studies.

3.   Results and Discussion

One of the main aspects of student that required improvement was their problem-solving skill which could be achieved by refining concept mastery. Natural Roaming Around (JAS) through Science Digital Storytelling made the learners easily constructed the earned knowledge, also, made them able to apply the technology in learning. The JAS approach emphasizes the real-life facts in the real world, therefore, the activities could help learners having diverse concepts, studying various concepts, and linking them directly to the real world. This is what-so-called the contextual learning [19]. Contextual learning facilitated the students to comprehend the taught concepts.

The JAS has given the students the opportunity to get to know the surrounding area and make it a learning resource, which would result in the improvement of the students' characters. The embedded characters after the JAS-based science learning include the environmental loving, environmental caring, creativity, responsibility, objectivity, and hard work.

Furthermore, the JAS approach emphasizes learning activities that linked to the real world. The employed JAS approach, according to [30], has several characteristics: (1) either directly or indirectly related to the natural environment through the use of media; (2) comprising several learning stages such as prediction, observation, and explanation; (3) students conduct presentation activities both orally and in writing as a report of JAS-based learning in the classroom, done with media showing the activities of exploring the surrounding nature. Videos may be comfortably used to show the natural surroundings, but not all videos are applicable in the JAS-based learning activities.

The video-aided learning that meets the characteristics of JAS can be done using the digital storytelling-based video. Storytelling is a community art used as a means of communication to disseminate information. In the education world, storytelling is used as a means to convey learning contexts related to history and science [31]. Along with the advancement of technology, storytelling is not only a narrative activity, but developed employing the media assistance in the form of images, videos, music, texts, narratives, and even comic [32].

The combination of various media and storytelling has a positive influence on learning activities. This learning activity is able to increase the learning motivation and become a guide for students in conducting learning activities. These activities could increase students' understanding of content, assist them in constructing knowledge, and facilitate students' critical thinking [33-35]. Science digital storytelling in this sense refers to [14] who stated that it is an educational media in the form of films describing the daily lives of students associated with the material content.

The Science Digital Storytelling was adopted as a medium of learning the classification topic. The stories included in the Science Digital Storytelling were ones dealing with everyday life experienced by the learners. The early stage in producing the Science Digital Storytelling video was the selection of everyday life experience, which should be closely related to the topic content so that the students would have a mapping concept in accordance with the division on each sub-topic. At the drafting stage, the selected example of everyday life experience was connected the subject matter, in which the relation of both had to be vividly described.

The classification topic consisted of several sub-topics, referring to the 2013 Curriculum, which is the classification of living things and inanimate objects; elements, compounds and mixtures; determination key plant classification; and microscopic living organisms and fungi. The concepts covered in the video were expected to be explored by the students in accordance with the arrangement of its background and storyline.

3.1.   The analysis of digital storytelling-based learning

The Digital Storytelling (science digital storytelling) is currently developed by many education experts. This discussion assessed the impact of science digital storytelling used in the learning process and the results appear in Table 1.

Table 1. The Review Results of science digital storytelling in the learning process

Results	Sources
The science digital storytelling was developed based on the expert validation was useful for a medium of instruction in Science Subject with the average percentage of 97.70% and 95.16% on media and content aspect respectively. The science digital storytelling was capable of significantly improving the students' metacognitive skills.	[14]
Learning adopting the storytelling technique was able to increase the average score yet there were some learners that tend to memorize. Learning with storytelling techniques in combination with also could increase the students' motivation and cognitive abilities.	[21]
The science digital storytelling-based learning increased the motivation of learners. The strength of the model lays on the inserted sociocultural values, for instance, the sense of cooperation manifested during the creation of videos in which the students worked collaboratively. The use of this medium increased the motivation of learners in improving learning outcomes. In addition, the use Science Digital Storytelling was the real example of the 21-st century learning skills; the ability to utilize technology in learning.	[22]
The Science Digital Storytelling was beneficial to reflect and provide insight to the students about cancer. The use of this medium could change the students' perspective of cancer patients. In addition, the improvement also appeared in the students' communication skills, creativity, and understanding about cancer.	[23]
Science Digital Storytelling taught the learners to be able to make comics. The results obtained from this study were the increased ability and skills of learners to use technology in science. The effective design used in this study was able to increase the students' participation.	[24]
The Journal of Digital Learning in Teacher Education published articles on science digital storytelling development that could improve the ability of teachers' preservation. Teachers that were able to produce Science Digital Storytelling had a higher confidence. Teachers applying the Science Digital Storytelling in learning were able to attract the students' attention and boost their learning motivation.	[25]
The Science Digital Storytelling was used to improve the learners' cognitive ability since it provided the information presented through drama to make the students focus and interested in receiving materials.	[29]

2. *The Implementation of Digital Storytelling*

The Science Digital Storytelling was used as the learning media for students on the Classification topic. The story contained in Science Digital Storytelling is a story relating to the students' daily lives. The Science Digital Storytelling creation process can help students to learn not only through one sense but also the senses they have. When students had learning activities with the JAS approach using Science Digital Storytelling, their visual, auditory, and kinesthetic skills are honed since the students directly explored and compiled the Science Digital Storytelling. This activity definitely could improve students' understanding of the classification concept in accordance with the research [5] which explains that learning activities should be able to utilize the skills of all senses.

At the Science Digital Storytelling production stage, the subject matter must be clearly described and comfortably collaborated with everyday events. The initial stage in creating the Science Digital Storytelling video was the selection of the daily lives experienced by the students that are closely related to the classification content so that they will begin to have a mapping overview in accordance with the division in each sub-chapter. The topic division is carried out based on the sub-chapters contained in the 2013 Curriculum which are (1) the classification of living things and non-living things; (2) elements, compounds, and mixtures; (3) the key determination of plant classification; and

(4) microscopic and fungal living beings. The concept of the told story contains scenes of exploring nature in accordance with the compiled setting and storyline.

The students were given a project of creating the Science Digital Storytelling, exploring the natural surroundings to make the flow of Science Digital Storytelling based on arranged stories. This made the students to directly involved in the process of creating the Science Digital Storytelling. The students' direct involvement has proven to motivate them in the learning process, which resulted in the increased understanding related to the concepts learned by the students [19]. The classification topic through the use of Science Digital Storytelling was discussed in four meetings, in which these stages are adapted from Karakoyun [20] while the product development was adapted to the Around the Nature Approach as seen in Table 2.

Science Digital Storytelling was used as a learning media for in the Classification topic. The story contained in Science Digital Storytelling related to the daily lives of students. The activity of creating the Science Digital Storytelling can help the students to learn not only through one sense but also using all the senses. When the students conducted learning activities with the JAS approach using Science Digital Storytelling, not only visual and auditory skills of students are honed but also kinesthetic because students directly explore and compile Science Digital Storytelling. This activity can, of course, improve students' understanding of the classification concept in accordance with the research [5] which explains that learning activities that education should be able to utilize the skills of all senses.

Table 2. The Implementation Stages of the Learning

Time	Explanation
The first week	Initial explanation of the materials and digital storytelling, grouping, and topic determination for each group. Each group was asked to observe the surrounding environment on the chosen topics for compiling stories.
The second week	The discussion of the content was used as the story. The Classification content must be included in the stories compiled by the students. In this process, they obtained the information in inquiry, that is about what the classification is and how to compile it as the storyline of the science digital storytelling.
The third week	The students compiled storyboards according to the indicators determined by the teacher. In preparing the storyboard, the students began to classify and explored the natural surroundings to reconstruct knowledge. At this stage, the students can start making the science digital storytelling.
The fourth week	At the editing process, the students had a review of the created science digital storytelling. The review would help the students to better understand the learned concepts because they could map the wrong and correct concepts.

At the creating stage of the Science Digital Storytelling, the content that becomes the subject matter must also be able to collaborate with everyday events and need to be described in real terms. The initial stage in making the video Science Digital Storytelling is to select the daily lives experienced by students that are closely related to content about classification so that students will begin to have an overview of mapping in accordance with the division in each sub-chapter. The division of topics is carried out based on the material sub-chapter according to the 2013 Curriculum, which is about the classification of living things and non-living things; elements, compounds and mixtures; the key to the

determination of plant classification; and the last is about microscopic and fungal living beings. The concept of the story conveyed contains scenes of exploring nature in accordance with the setting and storyline that was compiled.

Student learning activities will be given a project to make Science Digital Storytelling, explore the natural surroundings to make a flow of Science Digital Storytelling based on stories that have been made in accordance with the content obtained so that in the learning process students are directly involved in the process of making Science Digital Storytelling. Direct student involvement in the learning process makes students have high activity in learning activities. High activity in learning can increase understanding related to the concepts learned by students because students get direct experience related to the classification of living things [19]. The stages of the implementation of learning activities Classification through Science Digital Storytelling with the JAS approach were carried out in four meetings with the stages adopted from Karakoyun [20] with the development adapted to the Approach Around Nature in Table 2.

The difference of this arrangement lies on the students' full involvement in the learning. Their active observation in the natural surroundings was the focus of this stage.

Learning using Science Digital Storytelling with Natural Roaming Around (JAS) approach directed the learners to be able to make and prepare a story based on the natural surroundings and everyday occurrences regarding the classification packaged in video form. Besides being able to improve the students' understanding of the concept which tends to be rote, the science digital storytelling with JAS approach could also improve the students' skill to use technology in learning activities.

4.   Conclusion

Based on the literature review that has been carried out, it concluded that the Digital Storytelling-based learning with Natural Roaming Neighborhood approach could increase the students' concept mastery on the Classification topic. The process of preparing Digital Storytelling video was based on the natural surroundings in the life of students, by setting a place in an environment of biodiversity.

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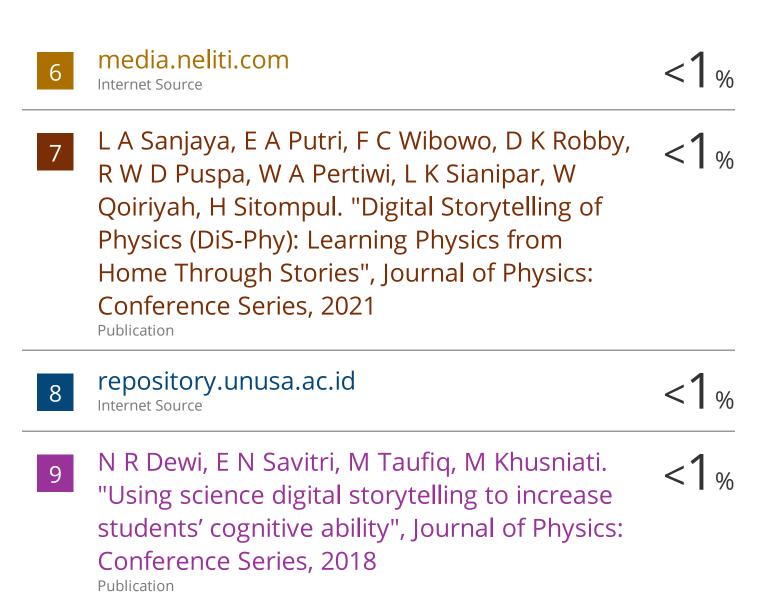[19]   Savitri E N, Sudarmin 2016 *Unnes Sci. Educ. J.* **5** 1109

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