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Development of Science Learning Videos Based on the Local Environmental Potential of Southeast Sulawesi

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Abstract: ***Southeast Sulawesi has a wide variety of local resources that can be packed into videos to be used for learning media based on the characteristics in curriculum of 2013. The objective of the research was to produce videos to science learning activities that would appropriately be used by teachers and students based on the model developed by Borg and Gall. Results on the feasibility of the learning videos validated by material experts were obtained that 87.42% the videos were in excellent criteria. Moreover, it was assessed from media experts that the videos were in excellent category, reaching an average of 82.31%. Validation results from science teachers as user of the videos were obtained that 78.33% were interested in using the video, 80.00% reported that the videos were helpful in understanding the materials, and also 65.00% reported that the videos were practical to use. The results showed that a learning video produced from this research is feasible for teachers and students as a learning media to science in SMP/MTs Southeast Sulawesi.***

Keywords: Potency of local environment, natural science learning video, SMP/MTs students

1. Introduction

The model of science learning using the curriculum of 2013 has not much changed from the previous curriculums based on the field observation in several junior high schools (SMP/MTs) in Kendari. Teaching and learning process is of teacher dominance and delivered by lecturer method, the minimum interaction between subjects and learning objects, teaching references are limited to the existing module, videos have not been utilized as a learning media, and limited learning media to support a self-study. In fact, science teachers have not contributed much to the development of learning media based on local environmental resources both in pictures or videos. Teachers use the references generally available, and those references are not necessarily suitable with school conditions and characteristics of the student. The stated that learning science/biology based on the potency of local environmental resources can be applied to enhance the learning effectiveness at schools and to reach comprehensive learning objectives [1].

As science and technology develop these days, the use of learning media is expected to help teachers increase the learning effectivity. The benefits of video as a learning media are it can send learning messages equally to the students, help present processes, phenomenon, or events clearly and it can overcome problems relating to time and space so that it helps to understand a concept [2].

The Previous study done concluded that interactive multimedia learning developed in the material of motion systems in humans could improve student learning outcomes [3]. Furthermore, the use of video learning in the classroom can increase student motivation and concept [4]. Then online video use in higher education can improve learning outcomes as a result of the explosion of Web 2.0 [5].

The production of learning video based on the potency of local environmental resources could help the teacher identify local potency to be used as a learning resource and to introduce students to environmental potency in Southeast Sulawesi that comparable to other provinces in Indonesia

2. Literature Review

Southeast Sulawesi has a wide variety of natural potency that can be used as a learning resource in the form of video. One example is Rawa Aopa Watumohai National Park with a total area of 105 194 ha. The park is located in four regencies: East Kolaka, Konawe, South Konawe, and Bombana [6], and possesses four ecosystems, i.e. swamp, mangrove, low land forest, and savanna. Those four ecosystems have their own distinction and uniqueness.

Based on the research and study literatures, there are several fish species identified in Rawa Aopa National Park, including snakehead fish (*Chana striata*), cat fish (*Clarias batrachus*), perch (*Tricogaster* spp.), gold fish (*Helostoma temenckii*), tilapia (*Anabas testudineus*), and eel (*Monopterus albus*). In addition, there are also waterfowl birds found such as stork (*Egretta intermedia*), milky stork (*Mycteria cinerea*), climbing perch (*Anhinga melanogaster*), Purple heron (*Ardea purpurea*), Nankeen night heron (*Nyctocorax caledonicus*), and whistling duck (*Dendrocygna arquata*). Meanwhile, the reptilian groups found were crocodiles (*Crocodylus prosus*), monitor lizards, *(Varanus salvator*), sail-finned lizard (*Hydrosaurus amboinensis*), phyton, *(Phyton reticulatus*), green snake, and black snake. There were also some mammals including cows (*Bos taurus*), buffaloes (*Bubalus bubalis*), deer (*Cervus timorensis*), boar (*Sus celebensis*), and midget buffalo (*Bubalus depressicornis*).

There are several plants found in swamp ecosystems, such as lotus flower, pandanus swamp, and weeds. Some mangrove

vegetation found were Rhizophora, Bruguiera, Soneratia, Nypa xylocarps sp., Aegiceras sp. Rawa Aopa National Park has diverse palm trees, and it is found at least 30 types of palm trees classified into 15 genera, and of those palms, 11 types are endemic to Sulawesi [7] .

Rawa Aopa National Park composed the high percentage of savanna, which is the association of grass (Imperata cylindrica) with cabbage palm (Corvpha utan), doub palm (Borassus flabelifer), thorny bamboo (Bambusa spinosa), tipulu (Arthocarpus teysmanil) and shrubs. The composition becomes an ideal place for several animals such as Maleo bird (Macrocephalon maleo), green jungle fowl (Gallus varius), red jungle fowl (Gallus gallus), knob bed hornbill (Rhyticeros cassidix), white imperial-pigeon (Ducula luctosa), yellow-crested cockatoo (Acatua sulphurea), and other types of water and migrant bird species.

12 families of water bird species and the most abundant families are also found in Rallidae and Ardeidae [8]. It was recorded that 76 species of bird consisting of 30 families found in the park. Of that species, 16 types are endemic to Sulawesi, 57 types are unprotected and 19 types were protected. Around 29 types of water birds (38%), while the rest are land birds (62%) [9]. There are 54 bird species found in mangrove area of the park. Of that, eight species are endemic to Sulawesi and three species are migrant species. Those eight endemic species are Dicaeum nehrkorni, Phylloscopus sarasinorum, Spizautus lanceolatus, Spilornis rufipectus, Zosterops consobrinum, Coracias temminckii,Loriculus stigmatus, and Coracias temminckii [10].

The Mekongga Mountains are a mountain range located in Kolaka Regency which has a forest with its own characteristics. The Mekongga Mountains scientifically meets the criteria for being designated as a conservation forest area, because almost all the criteria for becoming a conservation area are fulfilled, namely the physical area, biology, ecology, hydrology and socio-economic criteria [11]. The results showed that in the Mekongga mountains there were variations in morphometry and body colour patterns of several wasp species [12].

In the Mekongga Mountains, there are 27 types of understorey found. In Salodong Forest, 13 species of understorey were found with 217 individuals, found in 21 types of understorey with 342 individuals [13].

Basic data regarding aspects of biology, diversity and composition of species of biota, especially for endemic species, are prone to extinction and have economic value in the forest area is very necessary as a source of learning.

Wakatobi waters are generally rocky coastal waters which are overgrown with seaweed and seagrass which are quite extensive and are habitats to various types of echinoderms, especially from the Ophiuroidea (snaking star) group, Echinoidea (sea urchins), Asteroidea (Sea Stars) and Holothuroidea (sea cucumber). This biota can live in a variety of habitats such as coral reef flat zones, algae growth areas, seagrass beds, live coral colonies and dead coral and coral reefs (rubbles and boulders). Seagrass meadows are also one of the most productive and important marine aquatic ecosystems [14]; [15]. Seabird species are also found in Wakatobi National Park, for example brown booby (Sula leucogaster plotus), Malay plover (Charadrius peronii), Eurasian kingfisher (Alcedo atthis). Moreover, three species of sea turtles are also seen foraging in the park, such as hawksbill sea turtle (Eretmochelys imbricata),loggerhead sea turtle(Caretta caretta),andoliveridley sea turtle(Lepidochelys olivacea). Wakatobi is considered unique due to its biodiversity, and the coral reefs condition in the park making Wakatobi as the highest priority of world marine conservation in Indonesia. At least, there are four species of sea turtle identified in the park, including green and hawksbill sea turtle. Furthermore, there are around 396 species of sceleractanian, 31 species of fungia, 31 species of foraminifera, 34 species of stomatopoda, and 942 species of fish. Such invaluable biodiversity has formally made Wakatobi become Marine National Mark since 1996 [16].

There are 20 species of mangrove belonging to 11 families, and they are dominated by Rhizophoraceae. The mangrove species found in the park are *Rhizophora mucronata* Lamk; *Rhizophora apiculata* Bl; *Bruguiera gymnorrhiza* (L.) Lamk; Ceriops Tagal (Perr.) C.B.Rob;Ceriops decandra (Griff.) Ding Hou; Sonneratia alba Smith; Sonneratia caseolaris (L.) Engl; Avecennia marina (Forsk.) Vierh; Xylocarpus granatum Koenig; Xylocarpus molucensis (Lamk.) Rocm; Lumnitzera littorea (Jack) Voigt; Lumnitzera rascmosa Willd; Aeguceras cornikulatum (L.) Blanco; Osbornia octodonta F.v.M; Pemphis acidula Frost. & Acanthus ebracteatus Vahl; Nypa fructicans Wurmb; Excoecaria agallocha L; Acrostichum speciosum Wild; and Acrostichum aureum Linn. The mangrove flora in Wakatobi is distributed in Kaledupa, Lentea, Derawa, Hoga, Wangi-Wangi, Tomia, and BinongkoIsland [17].

Furthermore, there are 18 species of Echinodermata in Wangi-Wangi and Kapota waters, Wakatobi, Southeast Sulawesi. The echinodertmata consists of four types: echinoidea (sea urchin) represented by six types, Asteriodea (sea star) represented by 6 types and Ophniuroide Asteriodea (sea star) represented by 6 types and Ophniuroidea represented by two types [18].

Furthermore Wakatobi National Park has more than 112 types of coral reefs from 13 families and there are 93 types of commercial ornamental fish, several types of sea turtles and seabirds such as Brown Booby (Forster's) (*Sula leucogaster plotus*), Malay Plover (*Charadrius peronii*) [19].

While the use of local resources is the characteristics of curriculum in 2013, the potency of local environment resources in SE Sulawesi has not been optimally utilized for science learning activity. Science is reffered to the exploration of the surrounding natural environment and identification of various natural resources in Indonesia territorial [20]

Several materials in science of grade VII in SMP/MTs can make advantage of local resources as a source that can be delivered in the form of learning video. The materials are noun classification (BC 3.3. Identify the characteristics of living and non-living things and organism existing in

surrounding environment; the classification of living organism (BC. 3.3. Understand the procedure of classification of living organism and non-living things as a part of scientific work, and classify the variety of living or non-living organism based on the observed characteristics); and interaction between living organism and environment (BC. 3.8. Describe the interaction between living organism and environment).

The condition in the field showed that the lerning media that make advantage of local resources has not been available in local schools, specifically in Southeast (SE) Sulawesi. Therefore, it is important to develop a learning media in the form of video presenting the potency of local environment resources possessed by SE Sulawesi, and it is expected that the learning video could help teachers improve the learning effectivity.

3. Research Methods

Research Design

The research was designed using *Research and Development* (R&D) by adopting the model developed by Brog and Gall with the following stages: (1) information collection, (2) planning, (3) product development; (4) validation and trial [21]

Steps and stages in research

Information collection was carried out through preliminary study to know the real conditions on the implementation of curriculum of 2013 that should accommodate the potency of local environment resources in science of grade VII in SMP/MTs. Study on literartures and relevant research was done with respect to the theories relating to learning media and material content of science.

Planning stage was conducted to design the the learning video. The stages were (a) the mapping of basic competence (BC) based on potency of local environmental resources (b) formulate the objectives of the video; (c) design the frame of the video production.

Stages in the development of product mainly adopted the stages in the production of video. There were three main stages in video production: pre production, production and post production [22]. Following that, prototype was produced in the form of DVD.

Validation and trial stage. This stage was intended to indentify the feasibility, effectivity, application, and attractiveness of the learning video produced in the present study. In this research, trial was conducted on validators, people who examined the feasibility of the video based on the material content and media. Validators consisted of several people; three people speciallized in assessing material content, three people specialized in examining learning media and six science teachers as assessors of product users. The video was finitely played to 10 students.

Sample Collection

Descriptive analysis was performed to analyse the data collected in this study with presentation formula. The presentation was then interpreted to find out the level of achievement and validation of the obtained results.

Data were collected from the assessment and comments of material experts, media experts, science teachers, and response of student to the learning media. Data were collected through questioners on the feasibility of the learning video. The questioners were analysed quantitatively based on the following criteria: (4) excellent, (3) good, (2) average, (1) bad. In addition, descriptive qualitative was also performed based on the comments and suggestions as an input to revise the learning videos to the level of feasibility.

The assessment of videos development in the study was categorized feasible when the average assessment from the material experts, media experts and science teachers attained at least good category which was supported by the response from school students with at least good category

4. Findings

Science learning videos produced in the study consisted of three prototypes of DVD based on three basic competencies (BC) namely BC 3.2, BC 3.3 and BC 3.8. Data on validation results of the material expert assessment analysis are presented in Table 1. Meanwhile, results of the media expert assessment analysis are presented in Table 2.

Table 1: Results of material experts assessment analysis

Rated Aspect	Video 1 (%)	Video 2 (%)	Video 3 (%)	Average score(%)	Category
Material Conformity	100	100	100	00	Excellent
Material Completed	87.50	85.44	87.50	6.81	Excellent
Material quality	86.47	86.47	84.38	5.77	Excellent
Language quality	83.33	86.06	85.33	5.95	Excellent
Average	**87.75**	**87.75**	**86.76**	**7.42**	**Excellent**

Table 2: Results of media experts assessment analysis

Rated Aspect	Video 1 (%)	Video 2 (%)	Video 3 (%)	Average score (%)	Category
Readability of the text	81.25	81.25	83.31	81.94	Good
Image quality	88.35	83.35	81.65	84.45	Good
Video flow quality	85.33	96.70	85.33	89.12	Excellent
Sound quality	87.50	91.81	87.50	88.88	Excellent
The Use of media	97.94	95.81	97.94	97.23	Excellent
Average	83.33	81.58	82.02	82.31	Excellent

Based on table 1 and 2 it was obtained that the validation results assessed by material experts of the three videos were in excellent criteria (87.42%) and assessment from media experts showed that the videos were also in the excellent category (82.31%). This initial revision was then validated by science teachers as a product user, as seen in table 3.

Table 3: Results of teachers assessment analysis

Rated Aspect	Video 1 (%)	Video 2 (%)	Video 3 (%)	Average score(%)	Category
Material Conformity	100	97.90	100	99.30	Excellent
Material Completed	96.70	98.90	96.90	97.50	Excellent
Material quality	87.50	94.30	95.30	92.37	Excellent
The Use of media	96.70	95.80	95.80	96.10	Excellent
Readability of the text	97.70	97.90	97.90	97.90	Excellent
Image quality	91.70	95.80	96.70	94.73	Excellent
Video flow quality	94.40	97.20	97.20	96.27	Excellent
Sound quality	91.70	95.80	95.80	94.33	Excellent
Language quality	91.70	94.40	93.10	93.07	Excellent
Average	94.26	96.15	96.97	95.79	Excellent

Based on table 3, it was obtained that validation from science teachers as users of the three videos was in excellent category (95.79%). Following that, the revision was conducted according to recommendations and inputs from science teachers. The revised videos were then tested within the students to get their responses to the video. Their responses are presented in Table 4.

Table 4: Data analysis results of learners responses

Rated Aspect	Very Attractive (%)	Attractive (%)	Attractive Enaugh (%)
Video Attractiveness	78.33	20.00	1.67
Easeness of Understanding Material	80.00	20.00	
Practicality	65.00	35.00	

Response from students upon watching the video from three rated aspects showed that 78.33% students were attracted to watch the video. Meanwhile, 80.00% of students found easy to understand the material delivered in the video, and 65.00% students stated that the video was practical to use.

5. Discussion and Conclusion

Results of the study showed that validation results from the assessment of material experts for the three videos were in excellent category and media experts stated that the videos were in good criteria. However, there were several recommendations from the material experts, such as the selection of examples of living organisms. It was recommended to select the organisms representing plant groups, each organism needs to be displayed in its main parts and environment they live in. The material discussion should cover the characteristics in the picture, and the subtitle should not be positioned too low. Meanwhile, the media experts suggested that the selection of subtitle's colour needs to be adjusted to the background, the duration of text display should comparatively long, every picture should be mentioned its reference, the colour of the subtitle needs to be brighter, and the volume of background should be lower than the narrator.

Based on the recommendations and inputs from the experts, the videos were then revised in order that they can be appropriately used as a learning media for teachers and students. As a product user, the validation results by science teachers gave an assessment that in average the development of learning video was an excellent category.

Trial finitely conducted with students showed that they were generally attracted to the video in terms of its display, types and size of the text, and subtitle/animation in the video. Furthermore, the students can easily understand the materials after watching the video due probably to the pictures or objects presented in the video. For example, animals and plants were displayed clearly and representative to the materials in the science of grade VII in SMP based on the basic competency (BC) 3.2: identify the characteristics of living and non-living things and organism in surrounding environment, BC. 3.3: understand the procedure of classification of a living organism and non-living things based on the observed characteristics, and BC 3.8: describe the interaction between a living organism and its environment. In addition, the students stated that the videos were practical to use.

The above discussion has indicated that the produced learning video is feasible to use by teachers and students as science learning media of SMP/MTs in SE Sulawesi and to introduce the students to their local environment that can be used as a learning resource in science at schools.

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