



Development of Ethnoscience Motivational Video at Chemical Bonding Material

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Received: March 28th, 2024 ▪ Revised: June 29th, 2024 ▪ Accepted: October 31th, 2024

ABSTRACT

This ethnoscience motivational video was created utilizing the Microsoft Office PowerPoint 2021 application. This research uses the flow or steps of the design model from Borg & Gall as modified according to its needs. In this research, there are 5 main steps, such as preliminary studies, product design, validation, product trials, and final product results dissemination. The questionnaire was approved by instrument experts and declared feasible for validation and product trials. Product validation was carried out by three material experts and media experts each. The calculation results of each overall ideal percentage were 98% for learning material experts and 96.47% for media experts. The calculation results show that the motivational video is suitable for testing with an excellent category. Once the product was confirmed, class X students at various high schools in East Kupang conducted product trials in small and large groups. The evaluation of this product through a small group test involving eight students from a single high school yielded excellent results with an impressive 90% score, while the large group test with 32 students from three high schools achieved outstanding results with an impressive 96.25% score. Based on the results of product validation assessments and product trials of ethnoscience motivational videos on chemical bonding material, it is feasible to use them as media in early learning activities

Keyword: Development, Motivational Video, Ethnoscience, Microsoft Office Power Point 2021

INTRODUCTION

The effectiveness of learning is affected by several factors, such as the learning process. The learning process is a series of activities and interactions between students and teachers controlled through learning planning (Nasution, 2017). The implementation of the learning process is supported by learning procedures following the stages written in the Learning Implementation Plan. In particular, the learning stages are categorized into three learning activities, namely the initial, core, and closing activities. These three stages/learning activities have their own functions that require implementation. One part of the early learning activities that have an essential role in the learning process is motivation. The importance of providing

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motivation is because in general, during the initial learning activities, most students are still not focused on their attention (Abdul, 2012). The provision of motivation can arouse (attract) students' attention to focus on their lessons. The more appropriate the motivation given, the more successful the lesson becomes. So motivation will always determine the intensity of learning efforts for students. If students do not have motivation, the teacher does not guarantee the placement of students in certain classes, both their learning activities and their success (Ismiyati, 2015; Indrianti, 2018). The research results of Satria & Kusumah (2019) showed a positive correlation between motivation and learning outcomes. Learning outcomes will be optimal if given motivation in early learning activities encourage students to carry out learning activities (Satria & Kusumah, 2019).

The more attractive motivation in the early learning activities can arouse students' attention to the material to be learned. Student interest and motivation can increase if learning involves local wisdom culture (Shidiq, 2016). Culture is engaged in the learning progress enabling students to explore facts and phenomena in society and the environment integrated with scientific knowledge (Melyasari et. al, 2019). Science is one of the scientific knowledge that can involve culture in the learning process and is termed ethnoscience (Fransiskan et.al, 2021). Ethnoscience can be applied in learning chemistry to attract students' interest and motivation to learn. Many students consider chemistry an uninteresting subject (Nusi et.al, 2017). Chemistry involves abstract concepts such as principles, reaction equations, and mathematical operations that need thorough analysis and understanding. (Haris & Al Idrus, 2011). One of the chemical materials considered difficult is the chemical bond material taught in class X odd semester (Shelawaty, 2016).

The difficulties experienced by students in learning chemical bonding material are 1) Difficulty in understanding the concept, 2) The concepts of chemical bonding material are interconnected and require an in-depth understanding of concepts, 3) Learners can only repeat the definition of terms without understanding the real meaning (Eka et.al, 2015). The same thing was also presented by Shelawaty (2016)], namely: 1) Chemical bonding material is abstract and complete, 2) Chemical bonding material is related to concepts such as filling electrons in atomic orbitals, determining valence electrons, electron configurations, electron stability, depicting Lewis symbols, 3) Chemical bonding material is the basic material for understanding reaction rates, acid bases, electrochemistry, chemical equilibrium, and solution chemistry. Many students consider chemical bonding material difficult because of a wrong understanding of the concept (Rusdiana, 2010). In interviews, chemistry teachers R.G, M.R, and Y.S from three different senior high schools in East Kupang shared the same opinion: 1) Students have not been able to appreciate and connect the concept of chemical bonding material in chemistry subjects to the culture and local wisdom of East Nusa Tenggara (NTT); 2) The lack of understanding and mastery of the concept of chemical bonding material is evidenced by the average test scores and assignments on the basic competencies of chemical bonding, namely 34.56, 45.67, 35.54 which has not reached the Minimum Completion Criteria of 75; 3) In the initial phases of learning, teachers neglect to include engaging activities that link the idea of chemical bonding to the cultural practices of NTT. Interviews were carried out with M.L, Y.E, A.S, students in grade X from three east Kupang schools who have studied chemical bonding materials. They faced same obstacles in: 1) Confusion in understanding the differences in terms and sub-materials in chemical bonds, 2) The learning system in class uses the lecture method which seems monotonous. 3) Never knew the connection between the chemical bond material learned in class and the local wisdom of NTT, 4) Curious about the

correlation between chemical bonding material and NTT local wisdom culture.

Learning chemistry can be made easier by incorporating ethnoscience to engage students with motivating introductory videos. The motivational videos show the relationship between chemical bonds and the coloring process of traditional woven fabrics. Chemical bonds are formed between natural dyes and cellulose derived from cotton used as yarn during the dyeing process of traditional woven fabrics. Providing motivational videos is one way to introduce students to the local wisdom of NTT and compare it with chemistry. The local wisdom applied was the coloring process of woven fabric from Umpara, Alor Besar Village (Ternate Island), Northwest Alor District, at Alor Regency.

The selection of the coloring process of traditional woven fabrics from Alor Regency is due to the uniqueness of the natural materials used. Coloring materials come from plants and marine life such as purple color from sea cucumber (*Aspidochirotidal*), black color from Squid ink (*Loligo vulgaris*), green color of widuri leaves (*Calotropis gigantea*), dark brown and blue from seaweed (*Eucheuma spinosum*), brown color from mengkudu root (*Morinda citrifolia*), Yellow color from Turmeric (*Curcuma longa*) (Jelajah, 2020). Knowledge about how woven fabric gets its natural color can serve as motivation at the beginning stages of learning about chemical bonding materials and can be presented in the form of educational videos.

The new aspect of this study involves using motivational packaging in the starting learning tasks connected to NTT culture, presented in videos created with Microsoft Office PowerPoint 2021. Microsoft Office PowerPoint provides tools for converting PowerPoint presentations into videos by utilizing a slide show recording feature for recording slides and presenters. It also supports the use of pen tablets for writing formulas and additional notes, which can be recorded simultaneously (Microsoft, 2021). Videos on slides can be played and paused during screen recording along with the presenter's voice. This app allows for video creation without needing internet and without any subscription fee. The video outcome is in mp3 format, accessible on a mobile device. Based on teacher interviews, it is evident that incorporating motivation in initial learning tasks fails to link NTT culture with chemical bonding content, especially if it is presented in video format. Providing motivation in the initial learning tasks is crucial as it can spark students' interest in the subject they are about to study.

METHODS

Research Design

The development of ethnoscience motivational video at chemical bonding material, used research and development methods also known as R&D research. This research method is used to produce products and test their effectiveness of these products (Sumarni, 2019). This research uses the flow or steps of the design model from Borg & Gall as modified according to its needs. In this research, there are 5 main steps, such as preliminary investigation, product design, validation, product trials, and final product results. The initial phase of the preliminary investigation involved a study that included both field research and literature review. During the field study, a survey was carried out in multiple high schools in East Kupang, where a teacher and a student from one high school were interviewed to identify a problem requiring further research. A literature review examined how the bonding material in chemicals influences NTT culture, as well as the theory of video media development through the user-friendly application called PowerPoint. During the second phase of product design, the PowerPoint application was used to create the initial format and design. During the third phase, experts in chemical education and learning media conduct design validation to assess

the product's feasibility prior to testing. The next step is the product will be tested on the trial group to determine feasibility by analyzing the students' feedback. The last stage is the final result in the form of a revised product based on the trial results.

Participants

This study included four validators who are professionals in chemical education and learning materials, along with six chemical teachers from State Senior High Schools in East Kupang. Moreover, 40 students from three public high schools in East Kupang participated in the study, with eight students in the small group test and 32 in the field test, selected through purposive sampling.

Instrument

The methods employed in this study consist of interviews and surveys. Initial research was done by interviewing chemistry teachers and students to conduct a needs analysis. The research instrument for development utilized a questionnaire to confirm the product given to validators (lecturers and teachers) and gathered data by conducting trials with high school students in East Kupang. A questionnaire was the primary instrument utilized to evaluate indicators related to the quality of learning resource content, appearance, and media.

RESULTS AND DISCUSSION

Results

In this research, there are five main procedures: preliminary studies, product design, design validation, product trials, and final product results. The design validation was done by 3 material and media experts of each. In addition, limited product trials were done by 40 students divided into small and large groups. The following are the research results.

Preliminary Study

This development research is based on the problems that occur in three high schools in East Kupang through interviews with three chemistry teachers and three students. In interviews, chemistry teachers R.G, M.R, and Y.S from three different senior high schools in East Kupang shared the same opinion: 1) Students have not been able to appreciate and connect the concept of chemical bonding material in chemistry subjects to the culture and local wisdom of East Nusa Tenggara (NTT); 2) The lack of understanding and mastery of the concept of chemical bonding material is evidenced by the average test scores and assignments on the basic competencies of chemical bonding, namely 34.56, 45.67, 35.54 which has not reached the Minimum Completion Criteria of 75; 3) In the initial phases of learning, teachers neglect to include engaging activities that link the idea of chemical bonding to the cultural practices of NTT.

Interviews were carried out with M.L, Y.E, A.S, students in grade X from three east Kupang schools who have studied chemical bonding materials. They faced same obstacles in: 1) Confusion in understanding the differences in terms and sub-materials in chemical bonds, 2) The learning system in class uses the lecture method which seems monotonous. 3) Never knew the connection between the chemical bond material learned in class and the local wisdom of NTT, 4) Curious about the correlation between chemical bonding material and NTT local wisdom culture. One of the solutions is in the form of ethnoscience motivational videos. This video was developed with the help of Microsoft Office PowerPoint 2021 so that it is easy to

use.

Product design

Based on the results of the preliminary research, an ethnoscience motivational video was developed with a design as shown in Figure 1.

VIDEO MOTIVASI TENTANG SUB MATERI INTERAKSI PARTIKEL TERHADAP PERUBAHAN SIFAT FISIKA ZAT DALAM MATERI IKATAN KIMIA TERKAIT PROSES PEWARNAAN KAIN TENUN IKAT UMPARA DARI KABUPATEN ALOR

DAFTAR MATERI DAN LIST WAKTU VIDEO MOTIVASI

Daftar Materi	List Waktu
1. Video Pembuka Awal	00:00
2. Daftar Materi & List waktu video motivasi	00:12
3. Cover dan pengenalan identitas	00:34
4. Contoh Reaksi Kimia	01:41
5. Tenun Ikat NTT pada ajang Paris Fashion Week	03:26
6. Pembuatan Kapas hingga menjadi benang	04:35
7. Proses pewarnaan kain tenun Umpara dari bahan alami	04:51

Tenun Ikat sebagai Kearifan lokal budaya NTT
Tenun Ikat Nusa Tenggara Timur diajang Paris Fashion Week 2018

PROSES PEMBUATAN KAIN TENUN IKAT UMPARA DARI KABUPATEN ALOR

1. Proses Pemetikan, Pembersihan, Penghalusan dan Pemintalan Kapas
Struktur kimia selulosa (Komponen utama kapas)

2. Proses Pewarnaan dan Komponen Senyawa dalam Zat Pewarna Alami
Struktur kimia Moridin
EUMELANIN

3. Proses Penggulangan, Pengikatan Motif dan Penenunan benang menjadi kain tenun ikat

4. Pencucian & Proses Perawatan Kain
Kain tenun alor
Lerak (Sapindus Rarak)
Busa (Saponin) alami lerak

Ikatan Kimia Sebelum Penambahan Fiksator/ Mordant
2. Ikatan antara Selulosa dan Eumelanin
Struktur kimia senyawa selulosa dari kapas
EUMELANIN
Struktur kimia senyawa Eumelanin dari tinta cumi-cumi (Loligo sp)

Ikatan Kimia Sebelum Penambahan Fiksator/ Mordant
1. Ikatan antara Selulosa dan Moridin setelah Penambahan Mordant Kapur sirih
Selulosa
Kapur sirih
Zat Warna Moridin

Figure 1. Screenshot of the Ethnoscience Motivational Video

Validation

Table 1 shows the findings of the three material experts' thorough material validation examination. The average result of material validation was 102.67 with an ideal percentage of 98%. The following details of the aspects from material validation: a) content eligibility aspect of 98.46%; dan b) linguistic aspect of 96.67%. The results of the percentage calculation compared with the ideal criteria (Anufia et.al, 2019). The percentage value of the three aspects above is more than 85.01% and has an ideal category. This product is feasible to use. Even though it is considered suitable for use, there are several suggestions and ideas by the validator for the perfection of this product.

The researcher re-validated the instructional materials to the three validators (media experts) after changing the comments and ideas from the validators (material experts). Table 2 shows the average and ideal percentages (updated findings) for each material assessment indicator. The three experts' average media validation in the graphical element of the updated findings was 82, with an optimum percentage of 96,47%. The results of the percentage calculation compared with the feasible criteria (Trisnawati, 2018]. The aforementioned percentage number is more than 85.01% and belongs to an ideal category. This product is ready for usage without further review by media experts.

Table 1. Material Validation Result

Assessment aspects	Indicator	average	% ideal
Content eligibility	Suitability of the material with Core Competencies and Basic Competencies	59,17	98,46%
	Suitability of motivational videos with learning objectives		
	Appropriateness of motivational videos in explaining abstract concepts		
	Learning objectives are easy to understand		
	Material accuracy		
Linguistic aspect	The significance of learning materials	43,5	96,67%
	Principles of ethnoscience straightforward		
	Communicative (dialogical and interactive)		
	Suitability with the development of students		
Total score		102,67	98%

Table 2. Graphical Validation Result

Assessment aspect	Indicator	Indicator Items	Average	% Ideal
Graphics	Changeable	Students are attracted to the material by its look and front cover.	10	96,7%
		Students are attracted to the information by its cover and how it is presented.		

Illustration	Display animation is not complicated and continuous with each other	14,67	96,7%
	Balanced title placement		
	Placement of illustrations as background does not interfere with the title, text and images		
Color composition	Contrast background color	9,33	93,3%
	Use of font color		
Selection of font type and size	The typeface is readable and appealing.	10	90%
	The used font size is legible.		
Image eligibility	Interesting use of images and animation	14	90%
	Clear image captions and animation		
	The animation shown is easy to understand		
The use of music and sound	Unobtrusive video opening music	10	
	the explanation voice can be heard well		
Instructional Material Users	Programs or teaching materials are easy to understand	4,67	93,3%
Text readability	Text readability is appealing and clear.	9,33	90%
	The entire content is organized and concisely delivered.		
Total score		82	96,47%

Small Group Test

Products validated by experts were tested with students in small groups. The results of assessing student responses in small group trials are presented in Table 3. The average results on small group trial rating by respondents is 18 with a percentage of 90%. The percentage of student responses compared with ideal criteria by Widoyoko (2009) has an ideal category, and is feasible for use.

Table 3. Small Group Test Result

Assessment aspects	Indicator	average	% ideal
Display Quality	The initial appearance design of the video apperception is appealing	11,125	85,567%
	The font style and size in the perception video is appealing and legible		
	The visuals and animations in the perception video are clear, engaging not causing any visual distraction		
	The music or background sound in the perception video is not causing a distraction		

	the speaker's voice is clearly audible		
	The background color used in the video is not causing any distractions.		
	The visuals and motion graphics in the perception video aid in comprehending the concept of chemical bonding.		
	The content in the apperception video gives a first look at the material that will be taught		
Content Material	The content in the apperception video sparks interest and encourages further exploration of chemical bonding.	6,875	98,214%
	The content shown in the apperception video is connected to the NTT culture		
	Apperception video helps to interpret the local wisdom and culture in NTT		
	Total score	18	90%

Field Test

The tested products from small-group students then continued to verify on large-group students. Data on the results of student assessment responses in the large-group tested are represented in the table below. The average results on small group trial rating by respondents is 19,25 with a percentage of 96,25%. The percentage of student responses compared with ideal criteria by Widoyoko (2009) has an ideal category, and is feasible for use.

Table 4. Field Test Result

Assessment aspects	Indicator	average	% ideal
	The initial appearance design of the video apperception is appealing		
	The font style and size in the perception video is appealing and legible		
Display Quality	The visuals and animations in the perception video are clear, engaging not causing any visual distraction	12,25	94,23%
	The music or background sound in the perception video is not causing a distraction		
	the speaker's voice is clearly audible		
	The background color used in the video is not causing any distractions.		
	The visuals and motion graphics in the perception video aid in comprehending the concept of chemical bonding.		
Content Material	The content in the apperception video gives a first look at the material that will be taught	7	100%
	The content in the apperception video sparks interest and encourages further exploration of chemical bonding.		

The content shown in the apperception video is connected to the NTT culture		
Apperception video helps to interpret the local wisdom and culture in NTT		
Total score	19,25	96,25%

Based on students' responses (small group and large group trials), it indicates providing ethnoscience motivation videos can attract student enthusiasm for learning. Attractive motivation makes students focus on the lessons they will follow. Precise motivation makes the study more successful. The use of local culture in providing motivation in video packaged breakthroughs in encouraging students to learn. Because learning will be more effective if students have good learning motivation (Ismiyati, 2015; Indrianti et al., 2018; Satria & Kusumah, 2019). The final step is to promote this ethnoscience motivational video by distributing it to those who need it, both instructors and students in the learning process, in order to make this video an effective method of delivering encouragement at school and at home.

Discussion

Incorporating culture into the learning process can encourage students to actively explore the various facts and phenomena that exist in society and the environment. By integrating these facts and phenomena with scientific knowledge, chemistry learning, especially the topic of chemical bonding, can become more meaningful. Creating motivational videos that showcase these facts and phenomena at the beginning of learning activities can pique students' curiosity and make them more interested in the material they are about to learn.

A motivational video was produced using the Microsoft PowerPoint 2021 application. This application is very user-friendly, making the editing process easy and it's free to use. The video content can be shared with students either online or offline, which means educators don't have to repeat the material multiple times until students understand it. Additionally, students can watch the video at home or anywhere and at any time to review the material.

A research was conducted to explore the impact of video media development on motivation using Microsoft PowerPoint 2021 application. The video had a duration of 15 minutes and was shown during a meeting on the topic of chemical bonding. The material covered was based on the basic competencies 3.7 from the syllabus, which includes the connection between interactions of ions, atoms and molecules with the physical properties of substances. The competency achievement indicators of the research were to explain the forces between molecules, factors affecting the strength of van der Waals forces, and the ability to explain hydrogen bonding.

The impact of utilizing information technology on student motivation has become integrated. which is an integral part of daily life, including during the learning process. In the last few years, there has been a notable surge in the utilization of information technology by students. particularly with the introduction of devices like smartphones and tablets. Technology has the ability to utilized in the educational journey as a tool for learning and valuable learning aid for teachers and pupils. Hence, teachers and students specifically Teachers are required to be aware of technology. Teachers with strong technological skills can offer engaging educational materials to students, with the aim of boosting student interest in learning and enhancing academic performance (Aisy et al, 2024). This is a specific area

evaluated by media professionals when reviewing the videos in production, focusing on changeable indicators with two indicator items in graphic form: 1) Students are attracted to the material by its look and front cover; 2) Students are attracted to the information by its cover and how it is presented. This indicator shows a percentage ideal value of 96.7%, falling into the excellent category. The created video is meant to spark students' interest or excitement at the start of their lessons on chemical bonds. This statement aligns with the feedback from students regarding the extensive field trials: This video on apperception sparks excitement for learning by offering a preview of the subject matter; 2) The content in the video ignites interest and encourages studying chemical bonding due to its connection to NTT culture; 3) It helps to understand local wisdom in NTT as both a heritage from ancestors and a practical application of science in chemical bonding. According to the feedback provided, videos depicting this culture spark curiosity and inspire students to learn.

Additional studies have demonstrated that leveraging technology can boost students' motivation to learn (Siregar et.al, 2022). Rahmawati's (2023) study revealed that students who had been exposed to information technology while studying showed a marked increase in motivation to learn. In addition to motivation, Ahmad (2020) discovered in his study that information technology has a beneficial and noteworthy impact on students' inclination towards learning. As a result, creating motivational videos for beginning activities in the educational journey is crucial to boost students' enthusiasm and eagerness to learn.

Material experts and media experts have both examined this Ethnoscience Motivational Video. Even though no revisions were needed for the video, the material experts gave useful feedback for enhancing it, which the researcher implemented for the video's improvement. The changes made involve: 1) Incorporating videos about the production of Umpara woven cloth in Alor Regency, 2) fixing the upside-down arrow indicating hydrogen details, and 3) organizing the motivational video slide in the segment addressing sample queries.

Other than that, the material experts have provided some useful suggestions for further improvement, which the researcher has incorporated through revisions. The revisions include 1) The background of the introduction identity must not be broken to ensure easy visibility. 2) A list of materials and a list of time must be added. 3) The depiction of chemical structures in some compounds needs to be redone, as the previous images were fragmented. 4) The display of chemical structure reactions between cellulose and fixators was deleted as it was too broad and not suitable for students, following the validator's instructions. 5) The slideshow of sample questions, answers, and learning objectives was deleted based on the validator's advice due to time constraints. Feedback on the product post trying it out with a large group has been shared before. Students demonstrate curiosity and drive to learn about chemical bonding content upon viewing videos that incorporate cultural elements to teach the material. Still, these findings are predominantly qualitative, relying on the students' own explanations. Additional research is necessary to explore how this media can impact learning motivation and interest in the learning process.

CONCLUSION

This research and development study produced a product in the form of an ethnoscience motivational video, which covers subtopics related to particle interactions and the physical changes of matter in chemical bonding. The subtopic is linked to the coloring process on woven fabrics from Umpara, Alor Besar Village (Ternate Island), Northwest Alor District, Alor Regency. The ethnoscience motivational video was created using Microsoft Office PowerPoint

2021 and was subsequently published as a video. This video can also be distributed across various social media platforms. The validity of the ethnoscience motivational video was highly rated by material and media experts based on their assessments. Students' feedback on the developed video was categorized as very good.

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