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DEVELOPMENT OF MICROLEARNING-BASED LEARNING VIDEO MEDIA ON THE MATERIAL OF DYNAMICS AND POPULATION PROBLEM FOR HIGH SCHOOL STUDENTS

Fauzatul Fitrianal[1], Dinda Qarina Halma[2]*, Dedi Kuswandi[3], Muhibuddin Fadhlil[4]

State University of Malang, Jl. Semarang No. 5 Malang, East Java, Indonesia

*Author of correspondence, Email:dinda.qarina.2201216@students.um.ac.id

Abstract

This research was conducted using the R&D method to produce geography learning media that are easily understood by students. The purpose of this research is to develop microlearning-based video learning media on the topics of dynamics and population issues that are feasible, valid, and interesting. The development of this microlearning-based video media uses the Sadiman development model. The types of data used in this research -are quantitative and qualitative data. This research produced 7 (seven) videos consisting of 1 (one) video identity and 6 (six) sub-section videos on topics including population dynamics, population mobility, population quality and development, population issues, population analysis and data processing, and population composition. The feasibility and validity of the media have been validated by subject -matter experts at 89% and media experts at 100%. In general, students are aided and interested with microlearning-based instructional videos, as indicated by the questionnaire score acquisition of 90.8%, thus affirming the media's attractiveness and practicality for learning activities. Based on N-gain score calculations, after using microlearning-based video learning media on the topics of dynamics and population issues, students experienced an increase in concept understanding of 0.655 or 66% thus the improvement in student scores is categorized as moderate and the media is declared sufficiently effective for learning activities.

Keywords: Learning Videos; Microleaning: Population Dynamics and Problems

1. Introduction

Education in Indonesia has undergone significant changes with technological advancements. The ever-growing technological advancements have significantly impacted life, particularly in education. Adapting to the changing learning patterns of the millennial generation is a challenging task for educators, requiring them to determine learning strategies that are appropriate to their students' situations. Technology in education provides significant opportunities for teachers and students to freely and widely access a variety of learning resources. (Maritsa et al., 2021)One form of innovation in education is learning videos, which can support more engaging teaching and learning activities (Rahmawati & Atmojo, 2021).

The existence of media is a communication bridge between teachers and students, so that media has a role which is very important in helping the processI learning (Melinda et al., n.d.). Learning media is designed to make it easier for educators to deliver learning materials to achieve learning objectives (Prakoso et al., 2023). Learning media functions to present messages and information clearly, so that it can provide convenience and improve the learning process. (Ahdan et al., 2020). Media in learning activities is defined as a tool that can convey information and knowledge in interactions between teachers and students (Dora & Idris, 2019).

Based on the results of interviews with geography teachers and a questionnaire on the needs analysis of grade XI IPS students at Panjura High School, Malang, it was found that in geography, students often receive supplements in the form of learning videos. Learning videos provide an overview of problems in the surrounding environment, but these learning videos have not discussed the core material clearly and specifically. So students often find it difficult to relate learning materials to real problems, especially in the material on population dynamics and problems. Steps that can be taken to overcome this problem are to develop learning video media that can provide assistance to students in connecting problems with the concept of dynamics material with population problems.

The use of video learning media can be an effective alternative for learning activities at all levels (Setiawan et al., 2021). The implementation of learning with the help of video media can help teachers in achieving learning goals more easily and effectively, as well as with the use of learning videos it allows students to learn independently (Nashrullah & Soepriyanto, n.d.). Research conducted by (Putri et al., 2020) obtained the results that, pand students are more interested in using video learning media than just using books. By using video media, students can gain stimulation, experience, and perception of learning materials. Furthermore, using video learning media can improve reasoning and relationships in understanding material concepts (Utami, 2013b). In learning videos, the duration aspect greatly influences students' decisions to use videos again for learning. Long videos can reduce focus and decrease students' absorption of information (Marti & Luh Putu Tuti Ariani, 2023).

Microlearning It can be used to solve the problem of long learning video durations (Marti & Luh Putu Tuti Ariani, 2023). Microlearning is a short-term learning implementation with a specific, conceptual topic because microlearning aims to support specific and conceptual learning. (Ariantini et al., 2019) When delivering information using the microlearning concept, learning materials are broken down into smaller units. The purpose of breaking down units into smaller units is to provide more specific discussion and facilitate student understanding of the material. The primary concept of microlearning is to provide effective and efficient learning by focusing on a single topic (Marti & Luh Putu Tuti Ariani, 2023). Microlearningable to make knowledge easier to understand and remember for a longer period of time because microlearning presents information in small segments (Yusnidar & Syahri, 2022). Effective microlearning video media has a duration of more than 1 minute and no more than 3 minutes for each sub-topic (Susantyo et al., 2023). The use of microlearning-based learning media can produce effective learning, thereby supporting the achievement of students' learning competencies (Elpina & Haris, 2023).

Microlearning-based video learning media is considered suitableito be used in learning has the ability to improve the understanding and learning outcomes of students (Aritonang et al., 2023). Microlearning-based learning videos equipped with animation can help students understand the lesson, which can encourage them to participate and better understand what they are learning (Adhipertama et al., 2020). Research conducted by Seviana et al (2023) found that the microlearning-based media that had been developed was considered effective in improving student learning outcomes due to differences in post-test scores between the experimental and control classes.

The material on population dynamics and problems in Indonesia is one part of the geography subject with KD 3.5, namely analyzing population dynamics in Indonesia for

development planning (Wiguna, 2020). High school students must understand population dynamics and issues due to the importance of understanding changes in human populations and their impacts on various aspects of human life and the environment. Population dynamics and issues are contextual in nature, incorporating the environment as a learning resource for students and addressing complex population issues (Shabrina et al., 2023).

2. Method

This type of research is research and development that is often referred to as Research and Development (R&D). In this context, the development of video media is based on microlearning. This research was conducted by applying the Sadiman development model. The Sadiman model is a development model that is suitable for application in research on the development of learning video media (Kurniawan et al., 2018). The Sadiman model has 9 (nine) stages which include (1) Identification of needs, (2) Formulation of objectives, (3) Formulation of material points, (4) formulation of assessment instruments, (5) writing media scripts, (6) media production, (7) product trials, (8) product revisions, and (9) Media ready for use.

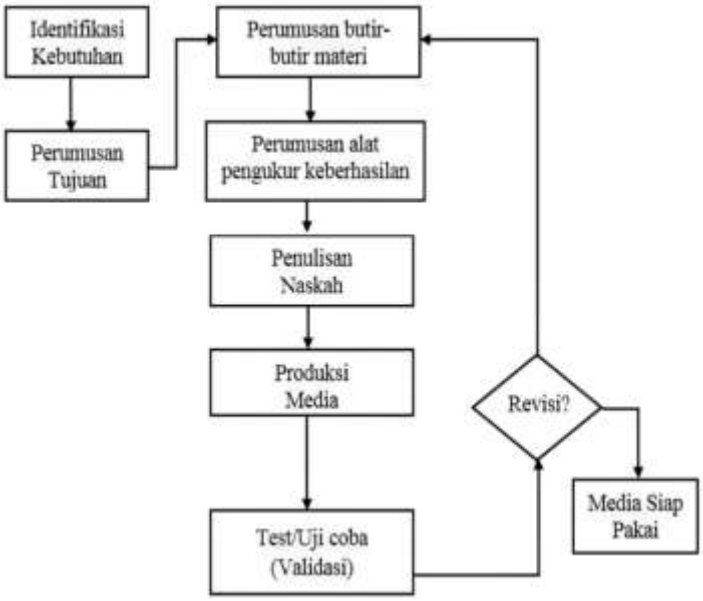


Figure 1. Learning Media Development Model Chart
(Sadiman, et al., 2014:101)

This study used both quantitative and qualitative data. Quantitative data were derived from validation questionnaires conducted by media experts, subject matter experts, and audience members, as well as student learning outcome tests. Qualitative data were obtained from observations, interviews with subject teachers, and critical suggestions from subject matter experts, media experts, and audience members.

Media that has been validated by experts will be tested on the audience. The audience is students of class XI-IPS I and XI-IPS II of SMA Panjura Malang. Individual trials will be conducted on 3 students of class XI-IPS II of SMA Panjura Malang. Small group trials will be conducted on 3 groups with each consisting of 3 students of class XI-II IPS of SMA Panjura Malang. And the overall trial will be conducted on students of class XI-IPS I of SMA Panjura Malang with a total of 28 students.

Questionnaire data analysis was carried out using the following formula, which was adopted from Arikunto & Jabar (2014):

$$P = \times 100\ \%$$

Information :

P = Percentage
$\sum X$ = Respondent Score
$\sum X_i$ = Ideal score total
100% = Constant

The level of suitability and validity of the data resulting from data processing will be measured based on the following criteria:

Table 1. Media Eligibility Criteria

Category	Percentage Range	Information
A	81% - 100%	Valid
B	61% - 80%	Quite Valid
C	41% - 60%	Less Valid
D	<40%	Invalid

Source: (Arikunto & Jabar (2014)

Processing of student learning outcome test data is done by calculating the learning outcome test scores, which consist of 20 questions.*pre-test* And *post-test.*This data processing is carried out using the N-Gain score calculation, which is carried out using the following formula:

$$\text{N Gain} =$$

As for the categorization of score interpretation*N-Gain* as follows:

Table 2. Categorization of N-Gain Score Interpretation

N- Gain	**Category**
G > 0,7	High
0,3 ≤ g ≤ 0,7	Currently
G < 0,3	Low

Halimah et al (2015)

Interpretation category of N-gain score effectiveness

Table 3. Interpretation Categories of N-Gain Effectiveness

Percentage (%)	Interpretation
< 40	Ineffective
40 – 55	Less Effective
56 – 75	Quite Effective
>76	Effective

Source: (Hake, n.d.)

3. Results and Discussion

3.1 Result

The product resulting from this research and development is a video-based learning microlearning on the material of population dynamics and problems. The video media developed consists of 1 (one) video identity and 6 (six) sub-section videos of material, namely dpopulation dynamics, population mobility, population quality and development, population problems, population analysis and data processing, population composition.

Figure 2. Display of Title and Author

Figure 3. Display of Sub-Material 1

Figure 4. Display of Sub-Material 2

Figure 5. Display of Sub-Material 3

Figure 6. Display of Sub-Material 5

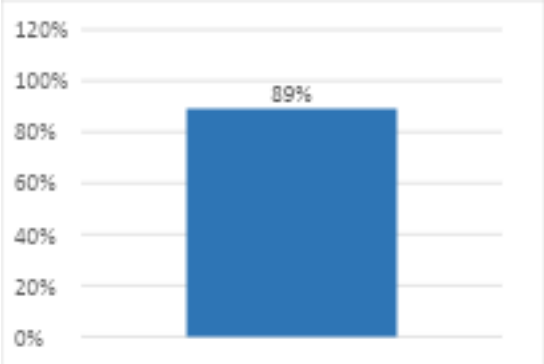
Figure 7. Display of Sub-Material 6

Figure 8. Display of Sub-Material 6

Before the trial is carried out on students, the learning mediaiThe product was first validated by material and media experts. The material experts involved in the validation were lecturers from Geography Education at Malang State University, while the media experts were

lecturers from Educational Technology at Malang State University. The following are the validation results from the material experts, media experts, and audience trials

A. Obtaining the Results of Material Expert Validation



Graph 1. Material Expert Validation

The calculation of material expert validation is carried out using the following formula:

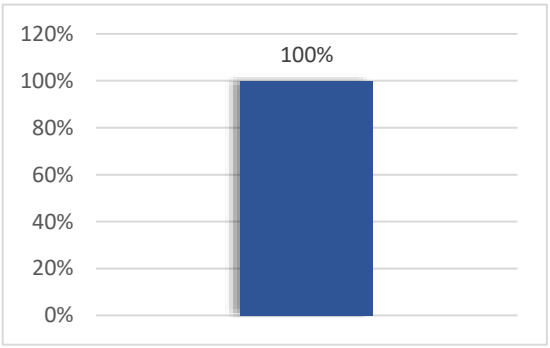
$$P = \times 100\ \%$$

$$= \times 100\ \%$$

$$= 89{,}2\ \%$$

From the results of the calculation of the percentage of material validity, the results obtained were 89.2%, so based on the eligibility criteria, it can be concluded that the material contained in the video-based learning*microlearning* on the material on population dynamics and problems, it is stated to be valid and appropriate for learning activities so that validation will be continued to media experts.

B. Media Expert Validation Results Obtained



Graph 2. Media Expert Validation Achievement

The calculation of media expert validation is carried out using the following formula:

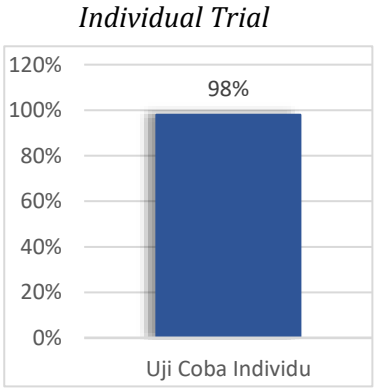
P = × 100 %

= × 100 %

= 100%

The results of the calculation of the media validity percentage show a result of 100%. Thus, based on the eligibility criteria, it can be It was concluded that the microlearning-based video learning media on population dynamics and issues was valid and suitable for learning activities. Therefore, validation will continue to conduct a trial of the final product.

C. Obtaining Trial Results



Graph 3. Individual Trial

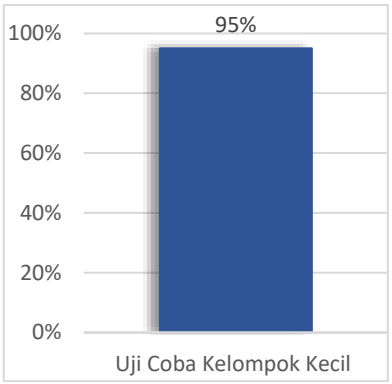
Individual trials were conducted to determine the attractiveness of the developed media. Data processing to determine the attractiveness of the media was calculated using the following formula:

P = × 100 %

= × 100 %

= 98.4%

Based on individual trial results, the microlearning-based video learning media on population dynamics and issues achieved a score of 98.4%. This score indicates that students were interested in learning with the help of microlearning-based video learning media, based on the established criteria. Therefore, this video learning media is not only engaging but can also be used to assist teachers in teaching population dynamics and issues to students.



Graph 4. Small Group Trial

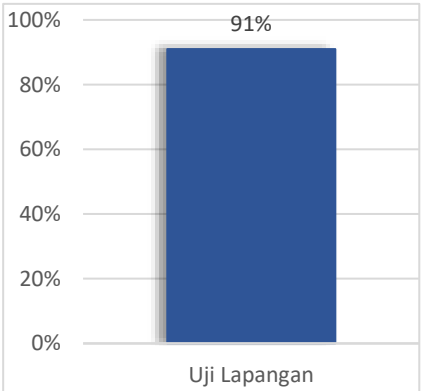
Small group trials This was done to determine the practicality of the media that had been developed. Data processing to determine the practicality of the media was calculated using the following formula:

$$P = \times 100\ \%$$

$$= \times 100\ \%$$

$$= 95.2\%$$

Based on the results of small group trials of media Microlearning-based instructional videos demonstrate a high level of practicality, as demonstrated by the 95.2% score obtained from the small group trial percentage calculation, which indicates a high level of practicality. Therefore, this instructional video media can be the right choice for teachers to use in teaching population dynamics and problems to students.



Graph 4. Field Trial

The field test aimed to determine how engaging and practical microlearning-based video media was in the field. Data obtained from the field test was processed using the following formula:

P = × 100 %

= ×100%

= 90.8%

Field trials indicate that the microlearning-based video learning media on population dynamics and issues is considered engaging and practical for use in learning activities. The field trial percentage was 90.8%, indicating a high level of interest and practicality. Therefore, this video learning media can be an appropriate choice for teachers to use in teaching population dynamics and issues to students.

D. Student Learning Outcomes Test

Before the media is shown in class, students will work on pretest questions, and after the media is shown in class, students will be presented with posttest questions. The number and average scores on the learning outcome test are as follows: students as follows:

Table 4. Student Learning Outcomes Test

	Mark		Ascension	Ideal Score (100-Pre)	N Gain Score	N Gain Score (%)	Categorization of N-Gain Score Interpretation		
	Pretest	Posttest					T	S	R
Amount	1575	2375	800	1225	18	1837	16	6	6
Mean	56	85	29	44	0.655	66			

Student learning outcome test scores were processed using the N-Gain formula. This was done to determine the improvement in students' conceptual understanding after the implementation of microlearning-based video learning media. The N-Gain formula was used to calculate the average increase in test scores from pre-test to post-test, taking into account differences in initial scores between students. The N-Gain formula is as follows:

$$\text{N-Gain} = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Ideal - Skor\ Pretest}$$

$$= \frac{2375 - 1575}{(100\ x\ 28) - 1575}$$

$$= \frac{800}{1225}$$

$$= 0.655$$

From the results of the N-gain score calculation, the result was 0.655 or 66% so that based on the N-gain score criteria, it can be concluded that after using microlearning-based learning video media on population dynamics and problems material, students experienced an increase in conceptual understanding in the moderate category and the media was included in the category of quite effective for learning activities. Most students gave a positive response

after using microlearning-based learning video media. In general, students thought that they felt helped and interested in this microlearning-based learning video.

Learning video media is an audiovisual medium that combines the senses of hearing and sight, enabling students not only to listen but also to see the images (Mu'minah, 2021). Through video media, students can gain stimulation, experience, and perception of learning materials. Furthermore, using learning video media can improve reasoning and relationships in understanding material concepts. (Utami, 2013) Video media is a highly effective learning tool, not only delivering information optimally and stimulating student understanding, but also creating an engaging and interactive learning environment (Anistyasari & Fazain, 2022).

The advantages of video learning media include fostering student interest and motivation in learning, clarifying abstract material, and providing a more realistic picture (Munadi, 2008:127). According to Daryanto (Setia et al., 2022), one of the advantages of video media is its ability to display moving images and sound. This advantage is particularly attractive because students can absorb messages or information more quickly by using more than one sense. Furthermore, video learning media is considered capable of improving student learning outcomes (Insiyah & Fadhli, 2018).

Microlearning is a small segment-based learning method with a variety of media formats, enabling rapid understanding of the material and flexible accessibility through technology, information, and communication devices (Susilana & Riyana, 2020). In conveying information using the concept *microlearning,* Then, the learning material will be broken down into smaller units. The purpose of breaking down units into smaller units is to make the discussion of the material more specific and make it easier for students to understand the content being presented. Discussion of content in concept *microlearning* limited, for example to one topic or sub-topic per learning session so that students can learn in a short time and can understand the material easily. Presentation of material in learning *microlearning* made in very specific small segments making it interesting to study (Marti & Luh Putu Tuti Ariani, 2023).

Microlearning One easy and effective way to convey learning material concisely while maintaining the main topic to be studied according to the learning plan. This is in line with research conducted by Elpina & Haris (2023) where in the research the results obtained were that the use of learning media based on *microlearning* able to create effective learning, thereby supporting student learning outcomes. After implementing video learning media in the classroom, it was discovered that video media can help students achieve learning outcomes (Fitriani et al., 2020). Adapting content in *microlearning* is very necessary so that the content delivered will be easily understood by students (Nugraha et al., 2021).

Video-based learning media *microlearning* The material on population dynamics and problems for high school students can be used as a tool to improve students' understanding of concepts. Development of learning video media *microlearning* This has been validated by material experts and media experts. Values are obtained from material experts as large as The score was 89.2%, declaring the material in the media appropriate and valid for learning activities. Meanwhile, the media expert gave a score of 100%, declaring the media appropriate and valid for learning activities. The field trial score was 90.8%, declaring the media engaging and practical for use in learning activities.

Video-based learning media *microlearning* The material on population dynamics and problems for high school students received a positive response from the students. Most students felt helped in linking a problem to the material concept and were interested in the video-based learning media. *microlearning* In addition, after calculating the overall student learning outcome test using the N-gain score, it was found that the learning outcome test score experienced an increase in the moderate category, namely 0.655 or 66%, so that video-based learning media *microlearning* The material on population dynamics and problems for high school students is considered quite effective for learning activities.

Based on the student learning outcome test scores at Table 4 shows that the data obtained on the improvement of learning outcome tests by 16 students is categorized as high, namely more than > 0.7. Then, 6 students experienced an increaselearning outcome test in the medium category, namely with an increase of <0.3 and >0.7. Furthermore, there were 6 students who experienced an increase in the learning outcome test in the low category, namely <0.3. Based on interviews related to the results of the student learning outcome test, data was obtained that students who experienced an increase in learning outcomes in high category states that with the existence of video-based learning media *microlearning* This is very helpful for them in learning the selection of animations and problem examples that can help them in understanding concepts that are still abstract. Students who experience increased learning outcomes in the moderate category states that this learning video is quite interesting and helpful in learning activities, so that learning is not limited to using module books or worksheets. Meanwhile, students who experienced improved learning outcomes in the low category, stating that with the existence of video-based learning media *microlearning* this attracts attention to learning, but they tend to have difficulty understanding the material which must be adjusted to the speed of the video playback.

Advantages of video-based learning media *microlearning* which have been developed, among others: (1) There is a division of material into several sub-sections so that it can increase student focus in learning, (2) The video has a short duration, namely around one to three minutes, (3) The selection of animation is adjusted to the needs of the material, (4) In presenting the material it is linked to real problems that exist in the surrounding environment. On the other hand, this media also has disadvantages, namely (1) When students have started the video, the animation and sound will continue so that students must be able to adjust their own thinking speed, (2) The media can only be accessed online.

4. Conclusion

The microlearning-based video media on population dynamics and problems material that was developed consisted of 7 (seven) videos, with details of (one) video identity and 6 (six) sub-section videos of the material, namely dpopulation dynamics, population mobility, population quality and development, population problems, population analysis and data processing, population composition.By dividing the sub-material into these, it is hoped that it will make it easier for students to understand the concepts of the material presented and at the same time make it easier for them to re-access videos on parts of the material that they do not understand.

The development of this microlearning video media has been validated by material experts and media experts. The material experts' score was the score was 89.2%, declaring the material in the media valid and appropriate. Meanwhile, media experts gave it a score of 100%,

declaring the media appropriate and valid for learning activities. Meanwhile, the audience response questionnaire score for media interest and practicality was 90.8%, declaring the media engaging and practical for use in learning activities.Based on the calculation of the learning outcome test scores that have been carried out on 28 students of class XI-IPS I using the N-gain score, the value obtained is 0.655 or 66%, so that students experience an increase in conceptual understanding in the moderate category and microlearning-based video media on the material of population dynamics and problems for high school students is considered quite effective for learning activities.

Suggestions for further research include optimizing the product's content and providing current and relevant problem examples. This will reinforce the material and enhance students' understanding of the concepts. To disseminate the developed media, it is recommended to upload it to various social media platforms, such as TikTok and Instagram, given their popularity among millennial students.

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