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Developing video for agriculture product processing course in the subject of garlic snack production

A A Anggraeni*, D Nurtriyanti, W Rinawati and D E Murniati

Department of Culinary Science, Faculty of Engineering, Universitas Negeri Yogyakarta

*andian_ari@uny.ac.id

Abstract. The study aims to 1) develop an instructional video of garlic snack production for Agriculture Product Processing course, 2) measure the feasibility of the video. This is a research & development (R & D) study using 4D models (Define, Design, Develop, and Disseminate). The feasibility test was performed by two material experts, one media expert, and 30 students of XI grade in State Vocational High School 1 Cangkringan. The data were collected using 4-point Likert scale questionnaires and analyzed descriptively. The video had a duration of 12 min 9 sec with mp4 format. This video consisted of a) an opening section delivered by the presenter containing the introduction about snack product, main ingredients, and the selection of packaging materials, b) a content section consisting equipment and ingredients preparation, production process, packaging process, and expired date determination, c) a closing section delivered by the presenter containing evaluation and conclusion. The video was uploaded to YouTube channel Boga UNY of <https://youtu.be/s04y8VGoTak>. The feasibility test results of the video according to the material experts, the media expert, and the students were respectively 94.60%, 98.96%, and 93.85%. It can be concluded that the video is very feasible to be used as a learning media.

1. Introduction

Education technology keeps changing and education reform is needed in order to maintain its quality. It can be performed through various innovations in curriculum, learning methods, learning media, and facilities and infrastructure. Learning is the actualization of the curriculum that demands the teachers' activity, creativity, and wisdom in creating interesting activities in accordance with goals that have been set. Since the last few years, teachers have abandoned teacher-centered learning and shifted to student-centered learning (SCL) by using the help of information and communication technology (ICT). The use of ICT in learning is expected to increase student understanding [1].

The students of Vocational High School (VHS) nowadays are Z generation. They are the digital native generation. Z generation has been accustomed to using digital technology from a young age. They are born when the internet began to develop and grow in line with the development of digital media. Z generation was raised within the digital age, where diversity in technology is increasing and sophisticated, such as the presence of electronic hardware in the form of computers or laptops, mobile phones, iPods and so on. Therefore, students of the Z generation are able to master digital media quickly and love the use of digital media in learning. Students of Z generation tend to be more interested in finding learning material through electronic media with the help of search engines. Based on behavior and personality, the Z generation has 3 common characteristics. The first is technological fluency. They are proficient and familiar with the use of information technology including various computer or laptop



facilities and applications. All information needed can be easily and quickly accessed in their daily life. The second is a social creature that communicates and interacts with many people from various circles, not only with friends from one region or country but also across regions and countries. Z Generation has a higher tolerance for cultural and environmental differences. The last characteristic is their multitasking ability in which they usually do various activities at the same time. They can read, talk, watch or listen to music at the same time. They want everything to be done quickly and avoid things that are too slow [2].

21st-century learning refers to SCL learning and utilizes ICT in learning. SCL learning is considered suitable for the characteristics of Z generation. SCL refers to a learning strategy that places students as active and independent subjects who are fully responsible for their own learning, and able to learn beyond the classroom [2]. SCL learning media have characteristics such as being able in digital form and database, and they can be described using specifications to be searched in the search engine using keywords. SCL and ICT based learning media include visual, audiovisual, computer, presentation media, internet, and multimedia. Instructional videos are learning media that provide audio and visual concepts, principles, procedures, theories of application, and knowledge to help students to understand the materials [3].

The video as learning media offer many advantages including a) its ability to exposes the real state of a process, phenomenon or event, b) its integrated part with other media, such as text or images to enrich the exposure, c) its replay feature to see a more focused picture, d) its suitable use for teaching material, and e) its combination of video and audio for being more effective and faster in conveying messages compared to text media [4].

Video is suitable to be implemented in VHS with the Agribusiness Agriculture Product study program. The VHS should be provided with some facilities, such as LCD projectors, laptops, and computer devices as well as the availability of wifi that can be accessed by students to support the learning process. Many VHSs have been provided with these facilities. However, the subjects of Agriculture Product Processing in cereal processing competencies are still limited to cake and bread products. To enhance the students' insight, knowledge, and skills, it is necessary to improve the practice of cereal processing in the form of snacks, such as garlic snack products.

Learning media at the VHS Agribusiness Agriculture Product study program are still limited to textbooks and PowerPoint presentations. Therefore, an attractive SCL based audiovisual learning media is needed, especially for the garlic snack production. Students can access the video anytime and anywhere, as long as they connect to the internet network. Students can learn independently by watching the video tutorial. This study aims to develop and measure the feasibility of the learning video for the Agriculture Product Processing course, in the subject of garlic snack production.

2. Methods

2.1. Research Methods

This is a research and development (R&D) study that aims to produce certain products and test the effectiveness of the developed products [5]. The development model used 4D consisting of define, design, develop, and disseminate [6].

2.2. Feasibility Test

The research instrument was in the form of a video feasibility questionnaire for material experts, media expert, and prospective users. The material expert questionnaire consisted of 30 questions from 3 aspects, namely learning, material quality, and benefit. The questionnaire for media expert validation consisted of 33 questions with 3 assessment aspects, namely media quality, usage, and benefit. Meanwhile, the questionnaire for prospective users consisted of 30 questions to measure the aspects of learning, media quality, material quality, benefit, and usage. The instrument validation was examined using construct validity by expert judgment. The suggestions from the experts were used to revise the research instruments. The instrument validation examination found that the instrument was suitable for

data collection. The research subjects consisted of 2 material experts, 1 media expert and 30 students of XI grade of State VHS 1 Cangkringan as prospective users.

2.3. Data Analysis

To determine the feasibility of this media, the questionnaire of the Likert scale was used. It ranged from 1-4, in which the score of 1 was very infeasible, 2 was infeasible, 3 was feasible and 4 is very feasible. The data were analyzed descriptively using equation (1).

$$\text{Feasibility score} = \frac{\text{score}}{\text{maximum score}} \times 100\% \quad (1)$$

The feasibility score was converted to a feasibility category using interval scale data conversion to an ordinal scale [5].

Table 1. Interval scale data conversion to ordinal scale.

Feasibility score range (interval scale)	Feasibility category (ordinal scale)
>80%	Very Feasible
66% - 80%	Feasible
56% - 65%	Infeasible
<56%	Very Infeasible

3. Result and Discussion

The learning video for garlic snack production was developed using the 4D approach. The 4D research stages are explained below.

3.1. Define

The define stage consisted of problem identification and need analysis which was used as a guide for media development. Based on the observation results, the learning media used by teachers of VHS in the Agribusiness Agriculture Product study program were still limited to visual media, in the form of handouts, job sheets, pictures, and PowerPoint media. VHS actually used the revised 2013 Curriculum which applied SCL learning. Therefore, teachers should facilitate learning activities with various SCL-based media. Moreover, the students belonged to the Z generation or the digital generation who were accustomed to using electronic devices, such as mobile phones, tablets, PC computers, laptops, etc. The audio visual-based SCL media is very suitable to be developed because this media is in accordance with the characteristics of Z generation. The video of garlic snack production will be used in the subject of the Agriculture Product Processing course.

3.2. Design

One of the teacher's reluctance to provide learning video is the difficulty in doing teaching scenes in front of the camera. Therefore, so far many videos have been developed in the form of video presentations without showing the presenter and just recording the teaching activities in the classroom with natural speech without a script [7]. This kind of video is less interesting so that this research developed an instructional video that was more interactive.

The recipe for garlic snack making was obtained from the lecturer of the Culinary Science Department, Faculty of Engineering, Universitas Negeri Yogyakarta (UNY). This recipe was then translated into a script. The script consisted of two types, video script and animation script. The video script involved scene number, take number, time duration, video image source, video insert, narration, location, and description. The video script contained 3 sections: introduction, content, and closing section. The introduction section was delivered by the presenter. The introduction was a talking head session about the explanation of the snack description and classification, main ingredients for garlic snack and packaging choices. The content section consisted of equipment preparation, material preparation, manufacturing process, packaging process, and expired date determination. This section

was performed by talent with the guide from the narrator. The presenters can also appear in the content section to explain the critical process. The closing section was about evaluation and conclusion. The video script is used when recording the video so that the recording process can be performed fit with the plan.

The animation script contains the presenter narration and explanation insertions in the form of text, images, 2D / 3D animations, and special effects. The animation script guides the editors to assemble the presenter's scene. The presenter explanation session was accompanied by text, images or animation insertion to ease students' visualization while listening to the presenter's explanation.

After the video script and animation script had been developed, the two scripts were then validated by material expert and media expert. The script was then revised based on the suggestion from both experts. This design stage produced a feasible script to be used in the video recording process.

3.3. Develop

The develop stage aims to produce a learning video that suits the needs and feasibility standards. The develop stage consisted of 3 activities: video recording, video editing, and feasibility measurement. The video recording process was carried out in the Chemistry Laboratory and TV Laboratory, Faculty of Engineering UNY. The recording process for the presenters used a green screen background to make it easier in the editing process.

Videos were created using a variety of shooting techniques. The technique of recording video (camera angle) was the camera position to take the object. The recording process was performed using several camera angles, such as long shoot (LS), medium shot (MS), close up (CU), high angle, and eye level [8][9]. The object can be recorded using various camera angles, as illustrated in Figure 1 and Figure 2.

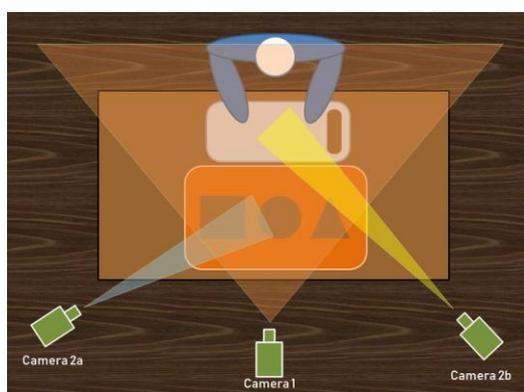


Figure 1. LS and MS camera angle.



Figure 2. Over shoulder camera angle.

The presenter session was recorded using MS angles with 2 cameras: front camera and side camera. The equipment and material preparation section were shot with CU, high angle or over shoulder techniques. The LS and eye level techniques were used for a general explanation of the production process, as illustrated by camera 1 in Figure 1. If the production process came into a critical stage, the video was taken with high angle, CU or over shoulder angles, as illustrated by camera 2a and 2b in Figure 1 and camera 2c in Figure 2.

The critical stages in garlic snack production were mixing, water addition, and packaging process. The critical stages should be emphasized to facilitate students' understanding of making garlic snack. The critical stages were recorded in a detailed visualization with the CU technique or a combination of CU, high angle and over shoulder techniques.

The recording process was carried out by presenter and talent with the help of the crew from TV Laboratory UNY. The editing process was carried out by the TV Laboratory crew. The presenter's session was added by text, image, or animation to reduce the boredom in the presenter's session. The

editing process in the content section combined various scenes recorded with LS, MS, CU, high angle and eye level techniques.

The video was developed in mp4 format with a duration of 12 minutes 19 seconds. The screen capture of this video can be seen in Figure 3 to Figure 12. The opening part (Figure 4) was delivered by the presenter who explained about snack description and classification, the main ingredients of garlic snack, and packaging material. The presenter sessions were visualized with texts, images or animations to ease student understanding.



Figure 3. Video cover.



Figure 4. Opening section by presenter equipped with text animation.

The equipment and material preparation section (Figure 5 and 6) showed the tools and materials used in making garlic snack. Text annotations were included in each tool and material scene to clarify the name of the tool, the name of the material and the amount of material. The addition of annotation text to the tools and materials was purposed to enhance students' understanding in preparing equipment and materials to make sure students can make the product correctly [10].



Figure 5. Equipment preparation section



Figure 6. Material preparation section

The process of making garlic snack (Figure 7, 8 and 9) consisted of mixing, molding, frying and packaging stage. The expired date determination section (Figure 10) described organoleptic testing to evaluate the color, flavor, texture, and taste of the product. Organoleptic testing was performed when the product was fresh and had been stored for 1 and 2 weeks. The expired date was determined by evaluating the difference of the organoleptic test result when the product was fresh and had been stored for 1 and 2 weeks.



Figure 7. Production process with over the shoulder camera angle



Figure 8. Production process with high angle technique.



Figure 9. Production process with CU technique



Figure 10. Organoleptic evaluation with LS and eye-level techniques

The closing section (Figure 11 and 12) was the final part of the video. It was presented by the presenter containing an evaluation of the factors that influenced the shelf life of the product and the conclusions of the video. The presenter session in the concluding section was also equipped with text, images or 2D animation to support students' understanding of the presenter's explanation (Figure 11).



Figure 11. 2D animation in the closing section



Figure 12. Closing section by the presenter

Figure 4, 5, 6, 7, 7, 9 and 10 also showed various types of shooting techniques. The Medium shot (MS) was taken from head to waist for the presenter session (Figure 4 and 12) so that the recorded human object was clearly seen. Over the shoulder angle (Figure 7) was used for image variations and better visualization of the production process. The high angle shown in Figure 8 was taken with the camera position above the object. The high angle was used for image variations. CU angle was used to capture video closer (Figure 9). The CU technique was usually carried out when the production process reached a critical stage so that the viewer can see more detail on the material condition or detail process. When the process was not critical, the images can be recorded with the LS technique (Figure 10). The eye-level angle in Figure 10 was recorded when the position of camera and object was parallel.

The learning video was then evaluated by the material experts and media expert. Based on the material expert validation results, the feasibility of the video material for making garlic snack can be seen in Table 2. Based on the material expert validation, the learning video of garlic snack production can be categorized as very feasible in the aspects of learning, material quality and benefit.

Table 2. The results of the feasibility assessment from the material experts

Aspects	Mean Feasibility Score	Category
Learning	93.75 %	Very Feasible
Material Quality	94.23 %	Very Feasible
Benefit	95.83 %	Very Feasible
Total	94.60 %	Very Feasible

The feasibility of the video according to the media expert can be seen in Table 3. The feasibility of video garlic snack production according to the media expert are categorized as very feasible in terms of media quality, usage and benefit.

Table 3. The results of the feasibility assessment from the media experts

Aspects	Mean Feasibility Score	Category
Media Quality	96.89 %	Very Feasible
Usage	100.00 %	Very Feasible
Benefit	100.00 %	Very Feasible
Total	98.96 %	Very Feasible

3.4. Disseminate

After assessment by the material and media experts, the video was then evaluated for its feasibility to 30 students of XI grade in Agribusiness Agricultural Products of State VHS 1 Cangkringan. The results of the feasibility test by students can be seen in Table 4.

Table 4. The results of the feasibility assessment from the students

Aspects	Mean Feasibility Score	Category
Learning	92.00 %	Very Feasible
Material Quality	96.04 %	Very Feasible
Media Quality	94.55 %	Very Feasible
Benefit	93.83 %	Very Feasible
Usage	92.83 %	Very Feasible
Total	93.85 %	Very Feasible

Based on the assessment results from the material experts, the media expert and the students as prospective users, the learning video of garlic snack production can be considered as very feasible to be used as a learning media in classical and individual learning in Agriculture Product Processing course for VHS in Agribusiness Agricultural Products study program. ICT-based learning media, such as learning videos, can be uploaded on video sharing sites, such as YouTube [11], so it can be accessed anytime and anywhere, without limited space and time. The video was then uploaded on the YouTube channel of Boga UNY with the URL <https://youtu.be/s04y8VgoTak> in order to facilitate the students to easily access the video. YouTube channel Boga UNY has been focused on developing learning videos in the areas of food assessment, nutrition, table manner, and food processing.

VHS students at this time are Z generation who are familiar with digital technology. They expect learning sources should be quickly found. In the classroom or laboratory, the practical subjects usually begin with the teacher's demonstration. The students learn to make the products or other practices by watching and then imitating teacher demonstrations. This learning method can be classified as TCL. As the TCL shifts into SCL, learning media need to be developed to support SCL. The practical subjects that initially started by teacher demonstrations could be changed to SCL by recording the demonstration activities. After the practical activity was recorded into a video format, the video can be uploaded on YouTube or other video sharing websites. Videos can be embedded into e-learning to support blended learning, especially blended learning with a flipped-classroom approach for practical subjects. If the school has not yet had a Learning Management System (LMS), the videos can be shared with students by disseminating the video URL. The students then can access the video at home or school before the class begins. Videos can also be played in class with an LCD projector and speakers.

Makarem [7] revealed that students' learning achievement in asynchronous learning using video without the physical presence of the teacher was not significantly different from face-to-face learning. This shows that video can replace the physical presence of the teacher to deliver the material. Makarem also reported that 68% of students had a positive perception of using video to replace face-to-face learning.

However, many teachers are still reluctant to develop learning videos because it requires expensive costs, a long time, a complex ability to speak in front of a camera and ICT capabilities. To face education 4.0, the schools and teachers were forced to adapt to these changes. Lately, learning videos with audio-visual quality that are favored by Z generation have been developed by several researchers. Videos

related to nutrition, food technology, food processing, and food and beverage services have been developed for VHS in Agribusiness Agricultural Product [12], [13], VHS in Culinary [14], [15] and higher education institutions in culinary science [16], [17]. The use of nutrition material videos on elementary students can attract students' attention and improve knowledge, attitudes and healthy eating habits [18]. Muhariati also reported that the use of bakery processing videos at pastry and bakery training institutes is able to improve the cognitive abilities of trainees [19]. The good learning process must be accompanied by a proper learning media that can attract the students' attention. Therefore, the development of instructional media that is expected by Z generation must be continued.

4. Conclusion

The SCL-based learning video of garlic snack production in the subject of Agriculture Product Processing for VHS Agribusiness Agricultural Products study program has a duration of 12 minutes 19 seconds. The video consisted of a) an opening section delivered by the presenter containing the introduction about snack product, main ingredients, and the selection of packaging materials, b) a content section including tool and ingredients preparation, production process, packaging process, and expired date evaluation, c) a closing section delivered by the presenter containing evaluation and conclusion. The video was uploaded to YouTube channel Boga UNY of <https://youtu.be/s04y8VGoTak>. The feasibility test results of the garlic snack production video according to the material experts, media expert and prospective users was respectively 94.60%, 98.96%, and 93.85%. Based on the feasibility test, it can be concluded that the video of garlic snack production is very feasible to be used as a learning media.

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