Developing learning video of making mango sorbet for agriculture product processing course

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Abstract. Generation Z uses technology frequently and demands learning that is individualized, engaging, digital, and visually based. They prefer learning videos to learn about the product making process. The research objectives were to develop the video of making mango sorbet for the Agriculture Product Processing course and evaluate the feasibility of the video. This was a research & development (R&D) study using 4D models (Define, Design, Develop, and Disseminate). The video was captured using Sony NX100 camera and Kino Flo 6-bank lighting. The presenter and voice-over dubber’s sound were recorded using Boya BY WM8 wireless microphone. The video was edited by Adobe Premiere Pro CC 2017. The video had a duration of 14 minutes 29 seconds with mp4 format. The video consisted of the opening section, the content section, and the closing section. The opening and closing section were delivered by the presenter. The content section was demonstrated by an actress and voice-over dubber. The video feasibility was evaluated by 2 material experts, a media expert, and 30 students of Vocational High School (VHS) 1 Cangkringan. The data were analysed descriptively. According to the feasibility evaluation, the making mango sorbet video was considered to be very feasible to be utilized as a learning media.

1. Introduction
The development of the 21st century is marked by the use of information and communication technology (ICT) in all aspects of life including the learning process. Various changes in the learning system were urged to enhance the quality of education, especially the learning process, curriculum development, and infrastructure. These circumstances emphasize the integration of ICT to improve the learning quality since it can provide more space for students' skills and knowledge development [1].

The urge for ICT implementation in learning is in line with the current vocational high school (VHS) students that belong to the generation Z. Generation Z is very dependent on technology. This generation prefers flexible learning methods to conventional styles. However, they are less independent, require structured direction, feedback, and periodic evaluations. The learning process will be interesting and easily understood by students if the teacher can design the proper media. The function of learning media is to clarify the message to avoid the content of being too verbal, overcome the limitations of space, time, energy, and senses. The effectiveness of the learning media depends on the appropriateness between the material to be taught and the teacher’s skills in using the media [2].

The video is a computer-based audiovisual media that can be used in mass, individual, or group learning processes. Students can obtain a better comprehension of the presented information from the video [3]. They find that video is easier to remember and understand because it uses 2 types of senses,
i.e. sight and hearing. The purpose of using a learning video is to develop self-confidence, technical skill, and interpersonal skill through individual and group activities [4]. Videos based learning is suitable in the productive learning courses since it can assist students to visualize the material [5]. Video may able to incorporate three domains of learning: cognitive, affective, and psychomotor [4]. As a result, the students will be well prepared to go through their practical activities.

One of the productive courses in the Agricultural Product Agribusiness (APA) VHS is Agriculture Product Processing. This course requires the understanding of the concept, and the logical, critical, and analytical thinking, as well as the cognitive and the psychomotor aspects. The aim of productive learning in the Agricultural Product Processing course is to train students' thinking skills and creativity in developing agricultural products that have a longer shelf life and increasing the production capacity.

Several videos for Agricultural Product Processing course have been developed, such as powdered ginger drink, peanut sauce, strawberry jam, fruit extract drink, soybean juice, noodle, chili sauce, fried peanut [6], fruit syrup [7], banana chips and garlic snack [8]. Nonetheless, the videos that discuss fruit product processing are still limited. Indonesia has the severe potential of fruit, one of which is mango. Mangoes have a fresh taste and contain rich nutrients. On the other hand, mangoes have a short shelf life, so that product processing and packaging techniques are crucial to extending the shelf life. Mangoes can be processed into sweets, juice drinks, chips, and sorbet.

Sorbet is made from crushed fruit added with sugar, honey, fruit acid, colour, food flavouring, and stabilizer. The stabilizer commonly used in sorbet are carboxymethyl cellulose (CMC) 0.2% or locust bean gum 0.25% [9]. The process of making mango sorbet consists of several critical stages that can affect its quality. The critical stages are selecting good raw materials, freezing the fruit for at least 8 hours to prevent melting during the mixing process, packaging that should be tightly-closed to avoid water droplets in the freezer, and avoiding the long mixing process that can cause melting.

This article discusses the development and feasibility evaluation of learning video of making mango sorbet for the Agricultural Product Processing course in APA VHS. The development of this video is expected to enhance students' expertise and skills. Fruit sorbets business can be included in the small-scale agro-industry sector which has huge potential prospects. Because of that, this video is also expected to raise awareness and knowledge among the wider community.

2. Methods

2.1. Research methods
This research can be categorized as Research & Development that aimed at producing a certain product and testing the effectiveness of the products [10]. The development model employed 4D (define, design, develop, and disseminate) approach [11].

2.2. Feasibility analysis
The research instruments were in the form of video feasibility questionnaires for material experts, media experts, and prospective users. The material expert questionnaire covered the aspects of learning, material, benefits, and usage. The media expert questionnaire consisted of media, usage, and benefit aspects. Meanwhile, the questionnaire for prospective users contained aspects of learning, media, materials, benefits, and usage. The video feasibility was evaluated by 2 material experts, a media expert, and 30 students of the eleventh-grade of VHS 1 Cangkringen as prospective users.

2.3. Data analysis
The questionnaire used a Likert scale ranging from 1-4 in which the score of 1 was very unfeasible, 2 was for unfeasible, 3 was for feasible and 4 was for very feasible. The data analysis technique was using descriptive analysis. The percentage of feasibility is calculated using formula (1).

$$\text{Feasibility percentage} = \frac{\text{Total score}}{\text{Total maximal score}} \times 100\% \quad (1)$$
The percentage of feasibility was then compared using the interval scale to ordinal scale data conversion, as presented in Table 1 [10].

| Feasibility Percentage Range (Interval Scale) | Category (Ordinal Scale) |
|---------------------------------------------|--------------------------|
| 0% - 25%                                    | Very unfeasible           |
| >25% - 50%                                  | Unfeasible                |
| >50% - 75%                                  | Feasible                  |
| >75% - 100%                                 | Very feasible             |

3. Results and discussion
The stages of research and development of video for making mango sorbet are explained below.

3.1. Define
Various information was gathered and learning problems were identified by the observations at APA VHS, namely VHS I Cangkringan. The learning media used by the teachers were still limited to verbal media, such as handouts, process instructions, PowerPoint presentations, and visual image media. Meanwhile, the students of this school can be categorized as generation Z who can master the media quickly and prefer to use digital media in learning [2]. Audiovisual instructional media has been preferred by generation Z students. This study would develop a learning video in making mango sorbet for the Agricultural Product Processing course.

3.2. Design
The learning video of making mango sorbet was classified as a demonstration video. The video consisted of the introduction part delivered by the presenter, the production part demonstrated by actress and dubber voice over, and the closing part conveyed by the presenter. The recipe for making mango sorbet was obtained from the second trial. The recipe was then translated into a video script. The video script became a guide for the tapping process [12]. The video script writing must be thorough and detailed based on the learning objectives to reduce errors in video recording and also to save time, fund, and effort. The script consisted of a video script and an editing script.

The video script table contained scene number, taking number, duration, visual source material, insert visual source, narration, location, and note. The scene duration was planned to predict the total duration. The video content should be accurate and up-to-date. The presenter narration was written from trusted sources, such as journals and books [12]. There was a difference between written language and oral language. The narration from journals or books should be carefully styled. The demonstration scene contained steps to make mango sorbet. The production steps were designed consecutively to avoid any flashback scene. In order to ease students’ understanding, the narration was created as short as possible and avoided complex sentences.

The editing script table contained the presenter narration and the additional insertions, such as captions, images, 2D animations, special effects, and transitions. The captions and images were added to emphasize the material explained by the presenter. Long text captions will distract the audience’s attention. The caption should be kept short as a summary to facilitate students’ understanding [13]. The use of 2D animation would ease content visualization and improve students’ understanding and motivation for learning [14]. Special effects were used to emphasize the caption and image in the presenter scene. Transitions were introduced to smoothen scene shift.

The video script and the editing script were then evaluated by material and media experts to confirm that the video content and language style had been appropriate. It was followed by some revisions on both scripts based on the suggestions from both experts. Revisions had been accomplished 6 times to ensure that the language style was easy to understand and accurate.

The presenter was selected based on the ability to teach in front of the camera, make eye contact with the camera, facial expression, and body language. The presenter candidates were asked to memorize 2
scenarios narration. The candidates were then shot using a camera and lighting. The actress was selected based on the ability to demonstrate the production process in front of the camera. The actress mostly would be shot from chest to waist, so that facial expression is neglectable. The dubber was elected based on the articulation and dialect.

3.3. Development

The shooting process for the presenter scene was performed in the indoor studio of Lab TV Universitas Negeri Yogyakarta (UNY) using green screen technology. The presenter shooting lasted for 1.5 hours. The demonstration scene was shot in Chemistry Laboratory UNY, which provided all production utensils to make mango sorbet. The demonstration scene shooting lasted for 4 hours. Prior to the demonstration scene shooting, the material should be prepared 8 hours to make frozen mango. During the demonstration scene shooting, it was necessary to ensure that the actress and the equipment remained in the same position when the scene in the same production step changed.

The shooting equipment was provided by Lab TV UNY. The camera was Sony NX1000 which supported a full high-definition (HD) resolution of 720 x 1080 pixels. The lighting was Kino Flo 6-bank. It had low power consumption compared to light output. The colour temperature didn’t shift when light levels changed. It produced naturally soft light colours. It was portable, flicker-free, instant-on, and dead quiet operation [15]. The sound was recorded by the wireless microphone Boya BY WM8. Each shooting process was preceded by 2 hours shooting equipment preparation to set camera angle, lighting, and actress preparation. Various shoot and angle techniques were used to reduce a monotonous view [4], such as eye level, high angle, long shoot (LS), medium shoot (MS), and close up (CU) techniques. Shots were performed using 2 cameras. Every scene was shot 3 retakes on average. The best taking number was written in the printed script. The voice-over recording process was carried out in a sound recording studio. The video shooting was not as complicated as video script writing.

The editing process was accomplished by combining video, voice-over recording, caption, image, animation, effects, transitions, and music. The editing was compiled by Adobe Premiere Pro CC 2017. The editing process was guided by the script. Without a good script, the editing process would be more complicated. The video was then discussed by the producer and team member majoring in multimedia development and mango sorbet production. Based on the team discussion, several revisions were performed. The background of the introduction and closing section was changed to contrast the presenter’s clothing colour. The transitions were added to smoothen the scene shift. The picture and font size were enlarged to attract the audience attention. The noise was diminished by sound editing or music addition. Scene duration was shortened to create a maximum of 15 minutes of total duration. Some voice-over narrations didn’t match the video script so that the retake process was necessary. Some presenter scenes didn’t contain any caption so that the captions were added to emphasize the audience’s attention. The video was revised 5 times until the producer and all team members assumed that the video was very appropriate.
The video duration was 14 minutes 29 seconds with the mp4 format. Figure 1 shows the screen capture of the video. The opening section (Figure 1a) was delivered by the presenter explaining raw material and product definition, making techniques, and packaging techniques. The content sections included the utensil preparation (Figure 1b), the material preparation (Figure 1c), the making process (Figure 1d), and the organoleptic testing (Figure 1e). The content sections were carried out by actress and voice-over dubber. The closing section (Figure 1f) informed the evaluation and conclusions and conveyed by the presenter.

Figure 1 also shows various types of shooting techniques. The eye level were used in Figure 1a, Figure 1c, and Figure 1f. Eye level was a catch of the eye view of a person which was parallel to an object to make the size of the object equal to the subject. The high angle was used in Figure 1c. The LS was shown in Figure 1a and Figure 1f. The MS is shown in Figure 1b, Figure 1d, and Figure 1e. MS was used for image variation and clearer visualization of the process. The CU shooting was provided in Figures 1c to display images more precisely. The CU technique was used in the utensil and material preparation, and during the critical stages in the production process. The CU technique would help the students to observe thoroughly on either the material condition or the process.

The video feasibility was assessed by 2 material experts and a media expert. Based on the assessment from material experts, the video had been categorized as very feasible with a feasibility percentage of 95.0%. It consisted of learning aspect 89.3%, material aspect 87.5%, benefit aspect 90.0%, and usage aspect 92.5%. The material experts score 87 - 93% in all aspects. It means that the video was able to deliver a message. The video helped students to understand the learning content more meaningful and thoroughly. The video also used simple and easy language terminology. The material visualizations were arranged in a good sequence and used high-resolution quality. The video graphic was created with high-resolution digital technology [16].

Based on the evaluation from a media expert, the video can be categorized as very feasible with a feasibility percentage of 93.9%. It comprised of media aspect 92.7%, usage aspect 96.4%, and benefit aspect 100.0%. The media expert commented that the video title was too fast and the colour contrast between the background and the presenter's shirt should be raised. The multimedia quality depends on the screen presentation and design which includes fonts, images related to the material, colour composition, and animation [17]. The media expert also highlighted the intonation difference between the calm voice of the voice over dubber and the powerful voice from the presenter. This suggestion can be taken into consideration on the presenters and dubber selection for the next video development. The tone of the presenter and dubber sound must be clear and easy to understand. The narrative voice should support to clarify the concept being conveyed in the video [17].
3.4. Disseminate

Furthermore, the feasibility test was conducted among the students as prospective users of the videos. The results of the feasibility test by the prospective users were in the very feasible category with a percentage of 88.1%. It was consisted of learning aspect 85.7%, media aspect 88.1%, material aspect 87.5%, benefit aspect 88.8%, and usage aspect 90.0%. However, there was one respondent who mentioned that the videos for learning were not effective. It confirms one aspect of education 4.0, namely personalization. Each student may have different understandings, preferences, and learning styles for the learning process [2].

The video of making mango sorbet making was shared on the YouTube channel of Boga UNY at https://youtu.be/9R2QJFlUoZE. YouTube is considered suitable for multimedia applications because it maintains a higher bitrate quality so that the quality of videos uploaded on YouTube can provide higher resolution [18]. Many food products making videos are globally accessible through YouTube. This video will contribute to quality-assured video. The video has already obtained copyright whose certificate can be downloaded through https://bit.ly/HKIsorbetmangga.

4. Conclusion

The video of making mango sorbet consisted of 3 parts: a) the opening section, explaining about definition, production techniques, and packaging; b) the content section, consisting of utensil and material preparation, product making, and organoleptic testing; c) the closing section, explaining about evaluation and conclusion. The video was provided with captions, images, 2D animation, special effects and transitions to ease students’ learning. The results of the feasibility evaluation showed that the video was very feasible to be used as learning media in the Agricultural Product Processing course.

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