Developing a Demonstration Video on Making Dry Banana Preferred by Generation Z

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Abstract. The student of vocational high school nowadays are classified as generation Z. They are common to use information and communication technology. They prefer audio-visual learning media rather than podcast recording or text media. This study aimed to develop a video on making dry banana for the Agriculture Product Processing course and assessing the video's feasibility. This study was a research & development (R&D) study using the 4D (define, design, develop, and disseminate) approach. Analysis of content, curriculum, and student needs was carried out in the define stage. The scriptwriting and production team selection was conducted in the design stage. Video recording, editing, and feasibility test from experts were performed in the development stage. The video was evaluated by two content experts and one media expert. In the disseminate stage, thirty students as prospective consumers evaluated the video feasibility. The data were analyzed descriptively. The video was in the mp4 format and had a duration of 13 minutes and 13 seconds. The video has been provided with high-definition images, captions, pictures, 2D animations, transitions, and effects. The experts and the students rated this video to be very feasible to be used as instructional media.

1. Introduction
Innovation comes not only from investment in modern technologies but also from investing people and their education to make this transition in technologies a reality. The key goal is to improve research and standard of teaching in education [1]. Education 4.0 aims to get young and seasoned staff up to date with Industry 4.0's creative ideas, building a competitive atmosphere that can speed up their acceptance in manufacturing [2]. Besides, the enhancement and expansion of teaching factories are significant, incorporating evolving digital technologies [2].

Students of Vocational High School (VHS) are now generation Z, born between 1995 and 2010. The use of ICT has been common to Generation Z. They have a better comprehension of acquiring new things by viewing the video rather than auditory explanation (podcast) or reading text [3]. Most generation Z students learn through watching and depending on platforms such as YouTube, or other video clips will also help educate these students, or educators would like to explore using their developing learning content for the classroom [4].

Videos are computer-based audio-visual tools that can be used in public, human, or collective learning processes. Students may obtain a deeper understanding of the knowledge contained in the video [5]. We think the video is easy to recall and understand because it uses two types of senses, i.e., sight and sound. Using a learning video builds trust, technological know-how, and interpersonal skills through individual and group activities [6]. Video-based learning is suitable for successful learning classes because it can help students imagine the content [7]. Video may be capable of incorporating...
three learning domains: cognitive, affective, and psychomotor [6]. Videos are recommended to improve cognitive skills or psychomotor skills.

Agriculture Product Processing (APP) is one of the productive courses in Agricultural Product Agribusiness (APA) VHS. This course includes understanding the idea, rational, objective, reflective reasoning, and the cognitive and psychomotor domains. The goal of successful learning in the APP course is to practice producing agricultural products with a longer shelf life.

Several videos have been developed for the APP course, such as ginger powdered drink, peanut sauce, strawberry jam, fruit extract drink, soy juice, noodle, chili sauce, banana chips, fried peanut [8], fruit syrup [9], garlic snacks [10], and mango sorbet. However, the videos which demonstrate the processing of fruit products are still restricted.

Banana is a favorite fruit densely grown in Indonesia. Bananas contain nutrients that consist of water, carbohydrates, protein, fat, and vitamins A, B1, B2, and C [11]. Physiologically, bananas are climatic fruits with a higher metabolism than other fruit types, causing rapid harm to bananas if no special steps are taken after the bananas are harvested [12]. One way to prolong bananas’ shelf-life is to turn them into different packaged banana products, such as a dry banana. Dry banana consisted of 15%-25% moisture content [13] so that it enabled to prolong the shelf life.

On YouTube, we found many videos demonstrate how to make dry banana. However, these videos’ content quality and audio-visual quality did not meet the requirement for learning video. The duration of some videos exceeded 15 minutes, which was considered to be very long. Those videos did not combine with animation, even though generation Z preferred animation. Some noises in those videos also distracted the students’ attention. The demonstrator was not straightforward when demonstrating the product making process. The thorough instructions were not well informed in those videos. Those videos were also not discussed the critical process step in making dry banana.

Therefore, the development of the dry banana video for the APP course needs to be conducted. This article describes the design and development of the video and the feasibility testing of the video. This video is a type of demonstration video, delivered by the host, provided with visual annotation and guided by a voice-over narrator in the demonstration scenes.

2. Methods

2.1. Research Methods
This study can be classified as Research & Development, which object to manufacture a new product and test the efficacy of the goods [14]. The 4D (define, design, develop, and disseminate) approach was used by the production paradigm [15]. Figure 1 showed the steps in the 4D approach.

![Figure 1. The 4D approach to developing the video](image)

2.2. Feasibility Analysis
We designed the questionnaires to assess the video feasibility. The content expert questionnaire provided with the learning, content, advantages, and usage aspects. The media expert questionnaire consisted of aspects such as advantages, usage, and media quality. The questionnaire for prospective customers covered facets of learning, content, advantages, usage, and media quality aspects. Two content experts, one media expert, and 30 students of the 11th grade of VHS 1 Cangkringan, DIY, Indonesia as prospective customers evaluate the video.
2.3. Data Analysis
The questionnaire used a scale of Likert, ranging from 1 to 4. The score of 1 was very unfeasible, 2 was unfeasible, 3 was feasible, and 4 was very feasible. The feasibility rating was determined using formula (1).

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\text{feasibility rating} = \frac{\text{total score}}{\text{total of the maximum score}} \times 100\%
\]

The feasibility rating was then measured using the interval scale to the ordinal scale data conversion, as seen in Table 1 [14].

Table 1. Interval scale data conversion to ordinal scale.

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

3. Result and Discussion
The phases of the creation of a demonstration video for the production of dry banana are described below.

3.1. Define
We gathered much information and learning disabilities in the APP VHS 1 Cangkringan. Teachers' instructional resources were restricted to written media, such as handouts, process orders, presentation slides, and digital picture media. In the meantime, students of this school could be classified as generation Z, who could quickly master the media and tend to use new technology to read [4]. The Z generation has favored audio-visual interactive learning media. This research would create a demonstration video to make dry banana in the APP course.

3.2. Design
We would develop a demonstration video to show the step of making a dry banana. The video consisted of three segments. The host presented the opening and closing segment. The actress demonstrated the core segment and was guided by the voice-over narrator. First of all, we designed a recipe to make a dry banana. The content expert reviewed the recipe. After the content expert recommended the recipe, it was rewritten into a video script. The video script has become a typing reference [2]. The preparation of video scripts must be systematic and accurate, based on the learning goals. Scriptwriting was essential to minimize mistakes in video production and save time, energy, effort, and funding.

The video script was written in table format. The table was consisted of several columns, e.g., scene number, taking number, scene length, main visual source, additional visual source, audio source, location, and note. The total video length was estimated by the scenes overall duration. The main visual sources consisted of the host or the actress. Meanwhile, the additional visual sources were included the text captions, animations, pictures, transitions, and special effects. The additional visual sources were usually needed in the opening and closing section to reduce the students' boredom to watch the host explanation. The text caption, pictures, and animations would highlight the content clarified by the host. The text caption was a short keyword to encourage comprehension among students [16]. Long word captions would draw the attention of the viewer. The animation simplifies content visualization, enhance student comprehension, learning motivation [17], and video engagement. The host scene used special effects to accentuate the text caption. The host position could
differ in each scene because the host might move from the left-side to the center-side of the video layout. The transitions were added to smoothen these scene changes.

The host presented the narration. The narration was searched from reputable sources, such as books and journal articles [2]. The content quality should be maintained up-to-date by using recent sources. Oral language was different from the written language, so that the explanation from the books or articles should be carefully translated to the oral language. The narration should be concise, brief, and use imperative form. A long and complicated sentence was rewritten to be 2 to 3 simple sentences to promote student comprehension. The demonstration scene featured steps to create a dry banana. We designed the video script carefully to prevent any flashback sequence and flashback narration in the demonstration scenes.

The content expert and media expert then reviewed the video script. The expert reviewed the content quality, vocabulary, language style, flashback scenes, and flashback narration. The video script was revised to meet the expert suggestion. We revised the script eight times until both experts declared the script feasible for video recording. In the video development stages, scriptwriting was considered to be the most complicated stage.

We selected the production team to ensure the best performance of each team member. The host selection should meet the requirement, e.g., teaching skill in the camera, maintaining eye contact with the camera, natural body language, friendly facial expression, articulation, and dialect. The requirement for the actress included demonstration skills and natural acting in front of the camera. The actress's facial expression was not emphasized because the camera would record the actress from waist to chest. Meanwhile, the requirement of the narrator was good articulation and dialect. The host and the narrator should not have a local dialect.

3.3. Develop
The recording session was performed in 2 different places. The host scene was recorded in the Lab TV Universitas Negeri Yogyakarta (UNY) indoor studio. We used a green screen to record the host scene to ease the editing process. The host recording needed 1.5 hours. Meanwhile, we recorded the demonstration scene in the Chemistry Laboratory of UNY. The Chemistry Laboratory provided the production utensils for producing dry banana. Before we recorded the demonstration scene, we prepared the material for 6 hours, especially to dry the banana. We needed 5 hours to record the demonstration scene. Throughout the filming of the demonstration steps, the director would confirm that the actress and equipment were located in the same place while recording the same scene.

Lab TV UNY supported the recording hardware. The Sony NX1000 camera, a high definition (HD) display with a maximum resolution of 720 x 1080 pixels, recorded the host and demonstration scene. The 6-bank Kino Flo was used as lighting. Compared to light output, it had low power consumption. As light conditions shifted, the color temperature did not alter. It produced soft and light colors. It was compact, flicker less, instantaneous, portable, and quiet [18]. Boya BY WM8 wireless microphone recorded the sound. Before the recording session, we needed 2 hours to prepare the recording equipment to set the camera position, lighting, and planning for the actress. We recorded the host and demonstration scenes using two cameras to shot the scene with the various camera angles. The primary camera or front camera recorded using eye level, high angle, long shoot (LS), medium shoot (MS), or close up (CU) techniques. The second camera was located on the host's left side to record the side view of the host. While in the demonstration scenes, the second camera recorded the production step from a high angle, over the shoulder, or zoom-in techniques. Various camera angles were essential to prevent a monotonous view [6]. We had retaken the scene three times on average. The final take number was then written in the printed script to ease the editor's job. The recording process for the voice-over was conducted on Lab TV as well. If the video script was carefully written, it would minimize the error during the recording session.

We used Adobe Premium Pro CC 2017 for the editing process. The editor integrated recording video from both cameras and voice-over. In the host section, the editor also combined text caption, effects, animation, picture, transitions. Finally, the editor inserted music in whole scenes. The script had directed the editing process so that the scriptwriting was the backbone of the video development.

The production team then discussed and reviewed the video based on multimedia and content quality. We conducted several revisions, as follows. Initially, we used a solid blue color for the
background in the host scenes. This color was not matched with the host’s clothing color, and the intense hue led to the viewer’s fatigue. We changed the background color to the green board. We expanded the picture size and text font size in the host scenes to draw interest from the viewer. We thought that some host scenes were boring due to the monotonous camera angle. To overcome this problem, we added some text annotations to highlight the keyword being explained by the host. Some scene shifts were considered not smooth, so that we added some transition between the scene shifts. In the demonstration camera, the primary camera's audio was not used to reduce the noise during the production process. We edited some recording voices to decrease the noise level. We trimmed some unnecessary demonstration scenes to create a cumulative duration of no more than 15 minutes. Several voice recordings containing local dialects were then retaken. We conducted six cycles of discussion and revision until all the production team agreed that the video was feasible.

![Figure 2](image1.png)

**Figure 2.** The video for making dry banana included: a) opening segment highlighted by text caption, b) utensil preparation emphasized by annotation, c) ingredient preparation provided by text caption to inform the size and material name, d) production step, e) shelf-life evaluation, and f) closing segment highlighted by text captions and effects.

The video was in mp4 format. In order to meet the maximum duration, the video duration was edited to be 13 minutes and 13 seconds long. Figure 2 displays the video's screenshot. The host presented the opening segment (Figure 2a) describing raw material, product description, production techniques, and packaging techniques. The core segment included preparing utensils (Figure 2b), preparing ingredients (Figure 2c), production steps (Figure 2d), and organoleptic testing (Figure 2e). The actress and voice-over narrator guided the core segment. The host delivered the closing segment (Figure 2f) to inform the assessment and conclusion.

Figure 1 displays many camera angles to record the video. Figure 2a, Figure 2b, Figure 2c, and Figure 2f shows the eye level technique. An eye-level shot referred to when the camera level was positioned at the same height as the character's eyes in the frame. Figure 2c displays a high angle technique. The CU angles were used in Figure 2c. The CU technique was selected when we tried to show the images more accurately. The CU technique would help the students to analyze the material or the procedure extensively. Thus, the CU technique was used to record the utensil preparation, ingredient preparation, and essential manufacturing process. The LS technique recorded all the host scenes (Figure 2a and Figure 2f). The MS technique recorded figure 2b, Figure 2d, and Figure 2e. We used the MS technique to focus the attention more on the object rather than the actress.

Two content experts and a media expert evaluated the feasibility of the video. Table 2 displays the feasibility test. Depending on the content experts' appraisal, the video was rated as very feasible with an 86.25% feasibility rating, and it consisted of several aspects: 87.50% learning, 86.54% content, 87.50% advantages, and 82.50% usage. This result showed that the content quality of the video was very feasible. According to the content experts, the vocabulary in the video was not complicated and
easy to understand. The demonstration visualizations were organized in a logical series. The video was able to deliver the knowledge to the students.

As displayed in Table 2, the media expert rated the video 96.21%, so that the video was very feasible. The assessment for each aspect was 100% advantages, 100% usage, and 94.79% media quality. Based on the assessment, the video used high-resolution videos, pictures, and animation. It was in line with the previous study recommending that video graphics should apply high-resolution digital technologies [19]. However, the media expert mentioned the intonation discrepancy between the host and the narrator. The host's intonation was strong, while the narrator's intonation was soothing.

### Table 2. The result of the video feasibility test.

| Aspect         | Content Expert | Media Expert | VHS Students |
|----------------|----------------|--------------|--------------|
| Learning       | 87.50%         | -            | 84.50%       |
| Content        | 86.54%         | -            | 86.25%       |
| Advantages     | 87.50%         | 100.00%      | 89.00%       |
| Usage          | 82.50%         | 100.00%      | 88.17%       |
| Media quality  | -              | 94.79%       | 92.67%       |
| Average        | 86.25%         | 96.21%       | 86.00%       |

Based on the suggestion from both experts, the video should be revised. However, the suggestion from the media expert was not applicable. To synchronize the host and the narrator's voice, we should change the host or the narrator. It was not easy to perform, and this video development was limited by funding. We will follow-up this feedback in the next project to synchronize the host and narrator's voice. The host and the narrator's voice needs to be consistent. The host and narrator's voice helped to deliver the idea expressed in the video [20].

#### 3.4. Disseminate

The students, as prospective consumers, then evaluated the video feasibility in classroom testing. The video was played in the classroom using an LCD projector, white screen, and speaker. Table 2 shows the result of the feasibility testing from the students. The students rated the video to be very feasible, with an average rating of 86.00%. The assessment consisted of 84.50% learning aspect, 86.25% content aspect, 89.00% advantages aspect, 88.17% usage aspect, and 92.67% media aspect. However, there was one student commented that the videos for learning were not useful. There were many types of learning styles, such as auditory, visual, or kinesthetic learning styles. Education 4.0 should facilitate individual learning based on personal preference [4]. We thought that this video was suitable for those whose learning style were auditory or visual styles. Only one out of 30 students thought that the video was not useful. It might be due to a different learning style. One student also commented that the color contrast should be increased between the background and the host's shirt. The screen design and layout affected the video quality. Video quality was dependent on text fonts, content-related pictures, animation, color composition, and color contrast [20].

Based on the feedback from the students, we did not revise the video. Only one student suggested the revision of color contrast during the host session. However, the other students responded that the color quality was very feasible.

The demonstration video of making dry banana was then posted at [https://youtu.be/JURcPqmV-fA](https://youtu.be/JURcPqmV-fA) on the Boga UNY YouTube channel. We selected the YouTube platform because YouTube offered the highest content quality for streaming video and was ideal for educational multimedia applications [21]. We had already given a copyright license for this video, and the license can be accessed at [https://bit.ly/2XcMRsP](https://bit.ly/2XcMRsP).

### 4. Conclusion

The video described the steps of making dry banana in the form of a demonstration video. It consisted of three segments: a) the opening segment, describing raw material and product description, manufacturing techniques, and packaging techniques; b) the core segment, consisting of utensils and ingredients preparation, production, packaging, and shelf life evaluation; c) the closing segment,
describing assessment and conclusion. The video was packed with text captions, pictures, animation, special effects, and transitions to ease the students' understanding. The student of generation Z preferred the combination of these visual sources. However, there was different intonation between the host and the narrator. Further video development should pay more attention to the host and narrator selection to synchronize both intonations. The feasibility assessment results from content experts, media expert, and the students were 86.25%, 96.21%, and 86.00%, respectively. Based on the feasibility test, the video was very feasible to be used as a learning media in the Agricultural Products Processing course. Teachers should design demonstration videos using various camera angles, captions, pictures, animation, special effects, and transition. Further research to measure video effectiveness in video-based learning or flipped classroom design should be applied.

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