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Utilizing interactive media in culinary arts education to enhance student learning outcomes

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ABSTRACT

This study aims to (1) Develop interactive Flash 8-based learning media for the Introduction to Culinary Arts course, (2) Evaluate the feasibility of this learning media, and (3) Assess students' acceptance of the developed media. The research was conducted in the Culinary Arts Education Study Program at the State University of Medan from June to August 2023. The methodology used was research and development (R&D) with the ADDIE development model, comprising the Analysis, Design, Development, Implementation, and Evaluation stages. The research subjects were 30 students, and the media was validated by two subject matter experts and two media experts. Data collection instruments included a questionnaire to assess material quality, media quality, and student media acceptance. Data were analyzed descriptively. The results indicate that the Flash 8-based media for the Introduction to Culinary Arts course is highly feasible for use, with material validation by experts at 98.33% (very good category) and media validation at 90.57% (very good category). The overall feasibility score averaged 94.52%, indicating a "very good" category. Additionally, students' acceptance of this learning media was recorded as very high, with a score of 4.94. In conclusion, the developed Flash 8-based learning media proved effective and can enhance students' learning outcomes in the Introduction to Culinary Arts course. This study contributes by providing an alternative interactive learning media that is feasible, widely accepted, and capable of improving students' understanding of the field of culinary arts.

INTRODUCTION

Science and technology are developing very rapidly in the 21st century. Quality human resources are needed to keep up with these developments (Alviyaturrohmah et al., 2017). In education, teachers should use technology to prepare creative and innovative learning strategies so that students can actively participate in learning (Cheng et al., 2018; Mukaromah, 2020). Technology positively influences the learning process (Khusniyah & Hakim, 2019; McKnight et al., 2016). Technology must be integrated into learning to be effective for teachers and students (Ghavifekr & Rosdy, 2015). The increasing reliance on technology in education has led to the widespread adoption of digital tools and interactive learning media to create engaging and effective learning environments. Technological advances have further contributed to the development of various learning media that can be effectively applied in teaching and learning activities, enhancing the overall educational experience for both teachers and students (Haleem et al., 2022; Komalasari, 2020).

Learning media is one of the tools that can be used in education to increase effectiveness and efficiency in achieving learning goals. Learning media is the most important factor in the teaching and learning process because it helps facilitate the teaching and learning process for

lecturers and students (Anwar & Anis, 2020). Using technology-based learning media in teaching and learning can significantly improve academic achievement (Al-Hariri & Al-Hattami, 2017). Learning media helps deliver material more easily and interestingly, making it easier for students to understand complex material. With learning media, teachers can present material more interactively and enrich students' learning experiences (Murcahyanto, 2024). However, in the context of culinary arts education, there is still limited research focusing on the integration of interactive media for teaching theoretical and practical aspects of cooking and food presentation (Liu et al., 2023).

Flash-based learning media is a media developed with the help of computer technology. Using computers to deliver learning materials allows active student participation and fast and accurate feedback. Adobe Flash learning media contains several elements, namely text, audio, graphics, animation, and aspects. Combining these elements produces engaging media and improves student understanding (Aminah, 2019). High-quality animation and visual display resolution in various Windows sizes because Flash uses vector graphics technology so that changes in size do not reduce image quality (Akhdinirwanto et al., 2024).

Despite Adobe discontinuing Flash Player support in 2020, the principles and features of Macromedia Flash 8 remain relevant in creating interactive learning tools, especially for regions with limited access to advanced technologies (Fiadotau, 2020). Macromedia Flash-based media is a combination of learning concepts with audiovisual technology that can create new features that can be used in the world of education. Multimedia-based learning can present learning materials more interestingly, not monotonously, and facilitate delivery. Students can study the material independently using a computer or cellphone with a multimedia program installed. This aligns with the need to develop cost-effective, technology-driven solutions to address resource constraints in vocational education (Das & Singha, 2024).

Research by Mahanani and Ekawatiningsih (2024) shows that the use of interactive media for culinary learning in vocational high schools helps students interact actively, makes the culinary education process more interesting and participatory, and improves students' understanding of culinary learning. This proves how important interactive media is in improving students' practical skills. In addition, research by Suyuti et al. (2023) shows that using technology in education, including animation and simulation, can significantly improve student learning outcomes, especially in developing cognitive and critical thinking skills. However, many studies have yet to explore how legacy technologies, such as Macromedia Flash 8, can be leveraged to meet modern learning needs, particularly in the context of vocational education in culinary arts (Murcahyanto, 2024).

Furthermore, Lestari (2023) reviews interactive learning in culinary arts education. Research shows that technology can improve students' learning experiences and their practical skills. This is directly related to culinary arts education and provides a perspective on how technology can be used to support learning in this field. Furthermore, according to research by Natasya and Izzati (2020) learning media assisted by Macromedia Flash 8 is very suitable for use in learning. Murcahyanto's (2024) research has also confirmed that Macromedia Flash 8-based media effectively increases student interest, understanding, and learning outcomes. Interactive multimedia based on Macromedia Flash 8 is considered very practical and effective for use in learning (Mantoviana et al., 2023; Rahmi et al., 2019). Based on previous research, media based on Macromedia Flash 8 shows that the media is valid and suitable for use as a learning medium for theory and practice. However, there are still few researchers who have developed Macromedia Flash 8 media in introductory culinary courses.

Introduction to culinary arts is one of the courses in the Family Welfare Education (PKK) study program, Faculty of Engineering, Universitas Negeri Medan, which discusses cooking techniques, types of kitchen spices, knowledge of ingredients, and food processing and presentation. Introductory culinary arts learning is theoretical and practical learning, so the learning materials delivered must be specific, and the learning media used must also be interesting. In this course, many students often forget the types of kitchen spices, the appropriateness of food ingredient management, and correct presentation techniques. So often, the dishes produced by students have a taste that is not yet appropriate.

In addition, the presentation of food is also not based on the characteristics of the food served, for example, the placement of garnishes that are not appropriate. The introductory culinary

arts course is basic to continue other productive courses. In the context of culinary arts learning, it is important to consider the needs and objectives of learning. Culinary arts is a practical learning of cooking and serving food using modern cooking tools. Therefore, learning will be effective if students are directly faced with practical equipment, but sometimes, the number of practical equipment owned is not balanced with the number of students.

Another disadvantage is that students cannot bring practical equipment for learning materials at home. Therefore, culinary arts can be taught interactively, so Macromedia Flash 8 is more appropriate. The complexity of the material to be delivered to students can be simplified with the help of Macromedia Flash 8 media. Its ability to combine text, images, animation, and interactivity makes it ideal for e-learning modules and educational materials. Macromedia Flash 8 is very suitable for use in practical learning as a substitute if the practical equipment is inadequate. Macromedia Flash 8 is also equipped with simulations so students can more easily understand how to cook and serve food properly.

The appearance of Macromedia Flash 8 can concretize abstract learning materials in the form of animations, videos, sounds, and interesting images so that it can attract students' interest in learning (Fakhri et al., 2018). With the help of Macromedia Flash media, students can absorb the material the teacher delivers maximally (Asrawati & Mulyati, 2018). In addition, Macromedia Flash 8 can be used independently, anywhere and anytime. Macromedia Flash 8 features can be used in various applications such as web animation, cartoons, interactive multimedia, and applications for mobile phones. In addition, Macromedia Flash 8 is compatible with other design and animation software.

Flash 8 has survived for so long and continues to have an impact today, especially in the context of legacy systems and content that is still in use. The following research by Saputra et al. (2020) states that Macromedia Flash 8 can create learning applications with the extension EXE. This application can be run on a computer with low specifications and installed on Windows 10. This means that students can run this application on their computers or laptops without worrying about the specification requirements that must be met on their laptops. Macromedia Flash 8 has powerful animation capabilities, providing innovative and sophisticated tools for creating smooth and complex vector animations. With a flexible timeline and support for tweens, animations can be created relatively easily compared to other technologies.

Macromedia Flash 8 is highly interactivity-enabled, allowing for rich user interactions, such as buttons, shapes, and web-based games. This makes it ideal for developing web games, interactive applications, and websites that require interactive elements. Although Macromedia Flash itself is no longer widely used, its impact remains in many aspects of modern web design and development. This is evident in the many companies and organizations that have developed Flash-based systems for internal applications, presentations, or websites that still rely on such content. Due to the cost and effort required to migrate to a new technology, some Macromedia Flash content remains in use today.

The novelty of this study lies in its attempt to combine legacy technology with modern learning methods and its focus on the field of culinary arts education. Although Macromedia Flash 8 has been around for a long time and has experienced a decline in use after Adobe's support ended, this study examines its relevance in today's learning context. By developing interactive media based on Macromedia Flash 8, this study fills the gap between legacy technology and modern learning needs. It explores its potential use in educational environments that still use Macromedia Flash.

In addition, this study fills a gap in the use of interactive learning media in the culinary arts field. Many previous studies have focused on other subjects such as mathematics, science, or language. With the aim of culinary arts, this study offers a new approach to understanding and teaching cooking and serving techniques more engagingly and interactively. This study is expected to show that interactive learning can significantly improve student motivation and learning outcomes. Macromedia Flash 8 creates simulations and step-by-step tutorials; students can learn cooking techniques directly. This bridges theory with practice, which is crucial in culinary arts education. This study encourages more inclusive education. This study shows how interactive media can be adapted to meet diverse learning needs.

This study aims to (1) Develop Macromedia Flash 8-based learning media in the introductory culinary arts course; (2) Determine the feasibility of Macromedia Flash 8-based learning

media in the introductory culinary arts course; and (3) Determine student acceptance of Macromedia Flash 8-based learning media in the introductory culinary arts course. Macromedia Flash 8-based learning media is very important to develop because there is no Macromedia Flash 8-based media in the introductory culinary arts course with the same learning objectives. The media contains material consisting of theory and practice where the practice can be displayed through animation, video, sound, and images. In addition, students can use the media independently by using personal cell phones anytime and anywhere.

METHOD

This research was conducted at the Culinary Arts Education Study Program, Universitas Negeri Medan, from June to August 2023. The program was selected due to its emphasis on practical and theoretical culinary education, aligning with the objectives of this study to develop and evaluate Macromedia Flash 8-based interactive learning media. The research uses a research and development (R&D) approach as outlined by Gall et al. (2003), aimed at creating a new product or improving an existing one with direct practical applications in culinary education.

Guided by the ADDIE development model, which consists of analysis, design, development, implementation, and evaluation, this study systematically addresses the challenges and opportunities in culinary education. The steps of the R&D process in this study can be seen in Table 1.

Table 1. R&D Stages Using the ADDIE Model

Stage	Activities
Analysis	The initial stage focused on identifying the needs of lecturers and students regarding learning media. Surveys and interviews were conducted to pinpoint gaps in current media usage and determine specific requirements for the introductory culinary arts course.
Design	Learning materials were compiled, and storyboards were created to visualize the structure and flow of the learning media. Applications such as Canva, CapCut, and Macromedia Flash 8 were selected to develop the media, ensuring that the tools align with the learning objectives and the content's nature.
Development	The media displays were created using Macromedia Flash 8, incorporating elements such as text, audio, animation, and interactivity. Validation was carried out by two material experts and two media experts to ensure the media's accuracy, usability, and alignment with the learning objectives. Feedback from the validation process was used to refine and improve the media.
Implementation	The validated media was tested on 30 students from the culinary arts education program. The trials assessed the media's usability, engagement, and effectiveness in supporting students' understanding of the course content.
Evaluation	Formative and summative assessments were conducted to measure the media's impact on students' motivation and learning outcomes. Data collected through structured questionnaires were analyzed using descriptive statistical techniques, including means and percentages, to identify the media's strengths and areas for further refinement. The percentage score was calculated using the formula $P = (f/N) \times 100$, where f is the score obtained by the validator and N is the maximum score. The Likert Scale used in this study ranged from 1 (Strongly Disagree) to 5 (Strongly Agree).

Data collection instruments included structured questionnaires designed to evaluate material quality, media quality, and media acceptance. The questionnaire was validated by experts to ensure content validity and reliability. Responses were analyzed using descriptive statistical techniques, including means and percentages, to assess user satisfaction and identify areas for improvement. Suggestions from material and media experts were incorporated into the final product before the large-scale trial.

Media validation involved two material experts and two media experts who assessed the Flash 8 media for accuracy, interactivity, and relevance. Small-scale trials were conducted with 12 students to refine the media based on their feedback, followed by large-scale trials with 35 culinary

education students. Data from these trials were collected using a Likert-scale questionnaire, focusing on criteria such as ease of use, engagement, and educational value.

To ensure the reliability of the findings, the study adhered to rigorous validation and trial procedures. Statistical analysis was performed using SPSS software to determine the mean and standard deviation of responses, enabling a clear understanding of the media's effectiveness and areas for further refinement. This methodological rigor ensures that the developed media meets educational standards and provides meaningful contributions to the field of culinary education.

Table 2. Validation Process

Validation Aspect	Assessed Criteria	Instruments Used	Analysis Method
Material Validation	Accuracy of content, alignment with learning objectives, and relevance to the culinary course.	Expert review and feedback forms.	Percentage analysis using the formula: P = (f/N) x 100.
Media Validation	Interactivity, ease of use, visual design, and technical functionality.	Expert review and usability tests.	Descriptive statistics with Likert Scale (1-5)
Student Feedback	Ease of understanding, attractiveness, and educational value.	Likert-scale questionnaires.	Descriptive analysis to evaluate effectiveness.

Table 3. Validation Process

No.	Source	Aspect
1	Student Needs Questionnaire	Initial Understanding, Learning Media Needs, Appearance
2	Material Expert Validation Questionnaire	Content Quality, Presentation, Language
3	Media Expert Validation Questionnaire	Presentation, Graphics
4	Group Trial Questionnaire	Aspects of Attraction, Content Quality Aspect, Display Aspect, Benefits Aspect
5	Student Acceptance Questionnaire	Guide and Informationm, Multimedia Material, Design and Features, Pedagogical Impact

RESULTS AND DISCUSSION

Results

This product development results in Macromedia Flash 8-based learning media in the Introduction to culinary arts course. This study uses the ADDIE development model. Based on the interview results, the course lecturer introduces culinary arts currently using the help of real media when explaining to students. The lecturer shows examples such as cooking spices and how to process them directly to students. However, many students forget the names of the spices and how to process them and serve the food, so when students practice independently, the taste of the food is not as expected. In addition, no Macromedia Flash 8-based media is available in the Introduction to Culinary Arts course to make it easier for students to transmit learning materials.

The media has features that make it easier for students to convey learning materials, such as animations, videos, images, and tutorials on learning materials. In addition to interviews, a needs analysis was conducted on lecturers and students for learning media. The analysis of lecturers' needs for Macromedia Flash 8-based learning media showed that 100% of lecturers stated the need to develop Macromedia Flash 8-based learning media in the introduction to culinary arts course to help communicate material to students following learning objectives.

The analysis of the lecturers' and students' needs for Flash 8-based learning media revealed a unanimous agreement on the necessity of such media in the Introduction to culinary science course. Among the lecturers surveyed, 100% of respondents (n = 4) stated that Flash 8-based learning media was needed to enhance the understanding of the course material. Similarly, in the student needs analysis, 100% of the 15 student respondents confirmed that Flash 8-based learning media is essential for improving their comprehension and engagement in the course.

These findings highlight the critical need for the development of Flash 8-based learning media, which aligns with the learning objectives and can serve as an effective tool to bridge theoretical concepts with practical application in culinary arts education. Based on this unanimous feedback, the study progresses to the next stage, namely the design phase of the learning media.

At the design stage, the materials were prepared, storyboards were made, and applications used in creating Macromedia Flash 8 media were determined, including Canva, CapCut, and Macromedia Flash 8. Canva was used to design the appearance of the media, and CapCut was used to edit learning videos. The software used to develop this media was Macromedia Flash 8. The development used a storyboard as a guideline, and during development, the selection of appropriate backgrounds, videos, and images was carried out carefully. The previously displayed material has been adjusted to the learning objectives, which involved refining the content to ensure it aligns with the specific skills and knowledge students need to acquire. Macromedia Flash 8 media contains text, audio, video, and images. It is hoped that this media will facilitate the learning and introduction of culinary arts material.

Figure 1 showcases the Macromedia Flash 8 media homepage, a treasure trove of Content. It houses the author's profile, competencies, materials, videos, and quizzes. Users can explore a variety of content, from introduction to culinary arts materials to engaging media that can be used to captivate and inform students.

Figure 1. Opening Scene of Macromedia Flash 8 Media

At the development stage, material and media experts validated the media to perfect the media. Material experts carried out the material validity test. The aim was to test the material's completeness, truth, and systematics. The material validity test assessed three aspects of material quality: content quality, presentation, and language. The content quality aspect consisted of 6 indicators, the presentation aspect consisted of 4 indicators, and the language aspect consisted of 3. Table 4 shows the results of the material validity test by material experts. In stage I, material experts assessed that the content quality value of 80.00% was in the good category, the presentation quality value of 85.00% was in the very good category, and the language quality value of 80.00 was in the good category. The results showed that the material validator gave an average value of 81.66%, which means that our Macromedia Flash 8-based learning media was in a good category, reaffirming its positive overall quality rating.

The stage 2 validity test results by material experts, part of a comprehensive study, showed a content quality value of 100.00% in the very good category, a presentation quality value of 95.00% in the very good category, and a language quality value of 100.00% in the very good category. The study results showed that the material validator gave an average value of 98.33%, which means that Macromedia Flash 8-based learning media for the introduction to culinary arts course is in the very good category.

Table 4. Stage I and stage II Results of Material Validity

No.	Aspect	Stage I Score (%)	Category	Stage II Score (%)	Category
1.	Content quality	80.00	Good	100.00	Very Good
2.	Presentation	85.00	Very Good	95.00	Very Good
3.	Language	80.00	Good	100.00	Very Good
	Average	81.66	Good	98.33	Very Good

The validation process of Macromedia Flash 8-based learning media by subject matter experts was conducted in two stages. In Stage I, the media achieved a validity score of 81.66%, which falls into the Good category. Following improvements and revisions based on expert feedback, the validity score increased significantly to 98.33% in Stage II, placing it in the very good category. These results indicate a marked improvement in the quality and feasibility of the media after the refinement process. The progression from Stage I to Stage II highlights the importance of iterative development and expert validation to ensure the media's suitability for its intended use in introductory culinary arts education.

From the data in stages I and II, the material used to develop Macromedia Flash 8 media is appropriate and suitable for introductory culinary arts learning. The material developed in the media must be based on core and basic competencies. Teachers as media users must be able to master the contents of the material in core competencies and basic competencies so that students can understand the contents of the material well (Hidayah et al., 2016).

The media validation process, a crucial assessment of the media's quality, appearance, and feasibility, was carried out by a team of expert media validators. These validators, with their extensive knowledge and experience, assessed two aspects of media quality-presentation and graphics. The presentation, consisting of 7 indicators, and the graphic aspect, consisting of 10, were thoroughly evaluated. Table 5 presents the results of this expert-led media validity test. The assessment in stage 1, with the media presentation aspect scoring 85.71%, is in the very good category, and the graphic aspect scoring 80.00% is in the good category. These results, a reflection of the validators' expertise, indicate that the media validator gave an average score of 82.86%, placing Flash 8-based learning media in a good category.

Table 5. Stage I and Stage II Results of Media Validity

No.	Aspect	Stage I Score (%)	Category	Stage II Score (%)	Category
1	Presentation	85.71	Very Good	97.14	Very Good
2	Graphics	80.00	Good	86.00	Very Good
	Average	82.86	Good	90.57	Very Good

The validation results from media experts for Macromedia Flash 8-based learning media were conducted in two stages. In Stage I, the media obtained a validity score of 82.86%, which falls into the good category. After revisions and refinements based on expert feedback, the score improved significantly in Stage II to 90.57%, categorizing the media as very good. These findings demonstrate a notable enhancement in the media's quality, particularly in terms of presentation and graphic aspects, which achieved scores of 97.14% and 86.00%, respectively, in the phase II validity test. The overall average score of 90.57% indicates that Macromedia Flash 8-based media is highly feasible and effective for use in introductory culinary arts education. The improvements highlight the iterative nature of the validation process, ensuring that the media meets educational standards and user needs.

Validation data by media experts in stages I and II showed that Macromedia Flash 8 media is not just suitable, but highly beneficial for introductory culinary arts learning. This media, which can be used to create interactive recipe demonstrations, visual aids for cooking techniques, and engaging quizzes, provides good aspects of the benefits and functions of the media, as outlined by Mawaddah et al. (2019). The Macromedia Flash 8-based media feasibility score results, after a comprehensive and thorough review by the material expert validator and media expert, can be seen in Table 6. Their meticulous review process has led to a very good feasibility rating of 94.52% for Macromedia Flash 8-based media.

Table 6. Feasibility According to Validators

No.	Description	n	Score (%)	Category
1	Subject matter expert validator	2	98.46	Very Good
2	Media expert validator	2	90.57	Very Good
	Average		94.52	Very Good

The subject matter expert gave suggestions and things to revise: capitalization of titles before the learning outcomes slide and adding the learning outcomes slide for each topic. Also, the tutorial video should be played at a higher speed. After media validation is complete, it is continued with a small group trial conducted by 12 students. A small trial is conducted to identify initial problems when using the media or product. The results of this trial can be used to revise the product.

Table 7. Results of Small Group Trials

No.	Indicator	Score (%)	Category
1	Aspects of Attraction	86,50	Very Good
2	Content Quality Aspect	81,45	Good
3	Display Aspect	85,20	Very Good
4	Benefits Aspect	87,66	Very Good
	Average	84,95	Good

The data in Table 7 show that the small group trial obtained an average of 84.95% in the good category. According to students, the quality of the content still needs improvement, particularly in the quality of images and videos. In response, we collaboratively made revisions and continued the trial with a larger group, ensuring everyone's input was considered.

Table 8. Results of Large Group Trials

No.	Indicator	Score (%)	Category
1	Aspects of Attraction	90,55	Very Good
2	Content Quality Aspect	87,00	Very Good
3	Display Aspect	88,60	Very Good
4	Benefits Aspect	91,25	Very Good
	Average	89,35	Very Good

Table 9. Students Acceptance Test Results

No.	Description	Mean score	Acceptance
1	Guide and information	4.53	Very High
2	Multimedia material	4.67	Very High
3	Design and features	4.63	Very High
4	Pedagogical impact	4.65	Very High
	Total score	148.40	Very High
	Mean score	4.94	Very High

The large group trial of 35 students obtained 89.35% very good categories, indicating a high level of effectiveness of Macromedia Flash 8-based media in culinary learning. This shows that the

media is not only suitable but also highly effective for culinary learning. The media acceptance test is the assessment used to determine the acceptance rate of the users towards the media, including the guide, content or material, design and features, media, and pedagogical impact. A student acceptance test questionnaire was used to determine the students' opinions on Macromedia Flash 8 media in the introduction to culinary arts course. Table 9 shows the results of student acceptance scores on Macromedia Flash 8 media in the introduction to culinary arts course, which is 4.94 in the very high acceptance category.

Discussion

Macromedia Flash is software that can develop interesting and interactive learning media and produce small files (Syabrina & Sulistyowati, 2020). This research was developed using the ADDIE development model. Macromedia flash media in this study contains images, sounds, animations, and various texts. Macromedia Flash 8 learning media has animations following the material with an attractive color selection proportion; the media also has complete content related to the competency objectives to be achieved. In addition, this Macromedia Flash 8 media is also equipped with a learning evaluation feature so that students can directly transmit their abilities independently. Animated displays can improve understanding of abstract concepts. Macromedia flash media can help convey material during learning. This learning media based on Macromedia Flash 8 is compatible with many platforms. The media can be opened not only via desktop but can also be opened in Android form.

Material and media experts tested the validity of Macromedia Flash 8 media. The validity test of material experts in stage I obtained a result of 81.66%, which means that the material in the media is in a good category but still needs to be revised. Based on input and suggestions from material experts, revisions were made to several aspects before being tested on students. After the revision, another validity test was carried out. According to material experts, the material quality in stage II was 98.33%, which was in the very good category. The results of the material validation were based on learning objectives, suitability of the material, effectiveness, and variation in information delivery (Sa'diyah, 2021). This means that the material in the Macromedia Flash 8 media that was developed is suitable for use in learning.

The validity of media experts in stage I obtained a result of 82.86%, which means that the media is in a good category but still needs to be revised. Based on input and suggestions from media experts, revisions were made to several aspects before being tested on students. The stage II validity test was carried out to assess the quality of the media. The quality value of the stage II media was 90.57% according to the media expert validator, which was in the very good category. Media quality is related to good-quality images and videos so that they are easier to learn (Pramana et al., 2016; Zikky et al., 2017). An attractive appearance can motivate students to learn (Sofyan, 2019). The expert validity test data from the material and media stated that Macromedia Flash media is suitable as a learning medium for introductory culinary arts. This is in line with research (Felia, 2022; Maclinton & Andrian, 2022; Masykur et al., 2017; Tanjung & Wandari, 2021) which states that Macromedia Flash-based media is suitable for use in learning.

The media validated by material and media experts is then tested on culinary education students. Small group trials conducted by 12 students obtained 84.95% with a good category. Large group trials conducted by 25 students obtained 89.35% with a very good category. The response of student acceptance of the media also showed a student acceptance score of 4.94 in the very high category. This is also in line with research (Yanty & Wirnita, 2022), which shows that interactive media using Macromedia Flash 8 is in the very high acceptance category.

From the validation results of material experts, media experts, small group trials, large group trials, and student acceptance responses, it was found that the use of Macromedia Flash 8 in culinary courses is effective in presenting visualizations of cooking techniques, the use of kitchen tools, and the process of making dishes interactively. Macromedia Flash 8 plays a crucial role in enhancing student engagement, as they can see the process visually and interactively, which helps them understand the material better. Flash-based media has been proven to increase student motivation and participation in learning. They feel more interested and involved in culinary materials, especially on topics that require practical practice, such as cutting, cooking, and serving techniques. With Flash

8, developers can use ActionScript to create interactive features such as cooking simulations, quizzes, and practical exercises. This allows students to learn actively and independently, strengthening their understanding through direct interaction with the media.

In this study, the development of Macromedia Flash 8 media makes students enthusiastic and happy in learning because the media contains material with animated displays, music, and themes following learning objectives. In addition, Macromedia Flash Media is very helpful for teachers in the teaching and learning process. This is emphasized by Yunus et al. (2022) that students' responses to Macromedia Flash learning media are very good and make students persistent in learning to understand the material. Macromedia flash media is an effort to stimulate student motivation to be actively involved in learning. A series of learning sessions using Macromedia Flash 8 media directs students to gain experience and conduct experiments so that they can solve problems in introductory culinary learning.

Students are directly involved in discovering concepts and solving problems so that knowledge can last longer, be easier to remember, and improve students' reasoning to think actively. This is emphasized by Handayani's et al. (2019), which shows that Macromedia Flash learning media can improve students' visual thinking. Thus, Macromedia Flash 8-based media can help improve student learning outcomes, demonstrating the effectiveness and impact of this learning tool. This also aligns with Nurhasanah and Zalela (2021), which shows that Macromedia Flash learning media can be used as a learning medium to help improve student learning outcomes.

Currently, the use of Macomedia Flash 8 in vocational schools has a major challenge related to its sustainability because technical support for Adobe Flash Player has stopped. This makes Flash 8 rely on Flash Player, which is difficult to access and has security vulnerabilities on the school network. This has the potential to be negative in the long term in the world of education. The curriculum becomes less relevant, and it can hinder students' ability to keep up with the latest technological developments in the world of work. This results in graduates having difficulty competing in the job market, so the results of media development using Flash 8 have very limited relevance to the needs of modern technology in vocational education.

However, Macromedia Flash 8-based learning media can still aid learning tools in the classroom, especially in practical classes that require animated media and in certain teaching scenarios where the focus is on the concept, not the technology itself. Macromedia Flash 8 media can continue to be utilized in modern learning by converting Macromedia Flash content to a more modern format, for example, HTML5 format, using a conversion tool such as Adobe Animate. This allows Flash to remain accessible through modern browsers. After being converted, the design and animation elements of Flash can still be used in a more modern context without losing the previously designed interactivity.

This article contributes to finding novelties in research related to culinary arts materials, increasingly realistic animation design, and integration with interactive elements such as exercises that can increase the effectiveness of using animation in learning. In addition, the study also highlights the importance of paying attention to the quality of animation content, such as information accuracy, compatibility with the curriculum, and connection to students' real lives. The limitations of this study mainly lie in the issues of old technology, security, and industry relevance. The implication is the need to focus on more modern and relevant technologies for future education and take advantage of research opportunities related to technology conversion, learning innovation, and the development of safer and more interactive learning tools.

CONCLUSION

From the results of this study, this study produces Flash 8-based media in the introduction to culinary science course. The development model used is the ADDIE development model. Macromedia flash media in this study contains animation, images, sound, and various texts. Macromedia Flash 8 media is equipped with a learning evaluation feature so that students can directly evaluate their abilities independently. In addition, Macromedia Flash-based media also pays attention to the quality of animated content, such as information accuracy, suitability to the curriculum, and

connection to students' real lives. This Macromedia Flash 8-based learning media is very compatible with many platforms. The media can be opened not only via desktop but can also be opened in Android form. The learning flow using Macromedia Flash 8 media directs students to gain experience and conduct experiments so that students can solve problems in introductory culinary learning. Students are directly involved in discovering concepts and solving problems so that knowledge can last longer, be easier to remember, and improve students' reasoning to think actively. The results of the material expert validation obtained 98.33% in the very good category, and the media expert validation obtained 90.57% in the very good category. According to the expert material validator and media expert, the results of the media feasibility are that Macromedia Flash 8 media is in the Very Good category with an average value of 94.52%. Small group trials obtained 84.95%, a good category, and large group trials obtained 89.35%, a very good category. The response of student acceptance of the media also showed a student acceptance score of 4.94 in the Very High category. The acceptance value of Macromedia Flash 8 media in Introduction to Culinary Arts is 4.94, which is in the very high student acceptance category.

The findings of this study are that Flash 8 allows the development of interactive and dynamic visual animations that can clarify culinary materials, such as cooking techniques, kitchen utensils, or serving dishes. Using animation and interaction helps students more easily understand difficult concepts if only explained textually. With Flash 8, developers can use ActionScript to create interactive features such as cooking simulations, quizzes, and practical exercises. This allows students to learn actively and independently, strengthening their understanding through direct interaction with the media. Macromedia Flash 8 offers flexibility in developing interactive media but requires special skills in animation and scripting. Errors in coding can cause the media not to function properly. Macromedia Flash 8-based media is expected to facilitate material delivery and increase student motivation in repeating learning to improve student understanding and learning outcomes. The limitations of this study mainly lie in the problem of technology that is starting to be used, so it is recommended that further research examine how learning content developed with Flash 8 can be migrated to more modern technologies such as HTML5, CSS3, and JavaScript, including studies on the best methods for migration, the impact on user experience, and the effectiveness of learning after migration.

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