



ORIGINAL RESEARCH

THE DEVELOPMENT OF CULTURALLY BASED ANIMATED FILMS TO PROMOTE BEHAVIORAL CHANGE AND PREVENT DENTAL CARIES IN CHILDREN

Fenita Purnama Sari Indah*, Ida Listiana, Fadlunnisya Istiqomah, Intan Mariska Sapitri, Siti Holisoh, Siti Mar'atu Zakiyah

¹STIKes Widya Dharma Husada Tangerang, South Tangerang, 15417, Indonesia

Corresponding author: Fenita Purnama Sari Indah STIKes Widya Dharma Husada Tangerang, South Tangerang, 15417, Indonesia *E-mail: fenita.purnama@masda.ac.id

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ABSTRACT

Oral and dental health constitutes an integral part of overall physical health, as it significantly influences the entire body. Various dental issues, such as dental caries, frequently develop in children later in life, thus emphasizing the importance of maintaining oral health from an early age. Poor oral hygiene in children often results from a lack of understanding and awareness, both from the children themselves and their parents, regarding proper routines for regular tooth brushing. This study aims to develop an educational medium animated films to promote behavioral change and prevent dental caries in children and to evaluate the feasibility of this animated film product. This study employed a mixed-methods design, combining both qualitative and quantitative approaches to comprehensively support the development of the animated film. The qualitative phase involved conducting in-depth interviews to perform a needs assessment related to promote behavioral change and prevent dental caries in children. The findings from this phase were used to guide the cultural and thematic content of the animated film. In the quantitative phase, the film was distributed to 35 fifth-grade students at MI Al-Barkah, Indonesia, selected using accidental sampling. Data collection involved the use of the User Experience Questionnaire (UEQ). Analysis of the students responses indicated an excellent rating across the dimensions of attractiveness, clarity, efficiency, accuracy, stimulation, and novelty. The data indicates that the product provides a highly positive user experience, especially in terms of Dependability and Perspicuity. These results suggest that the product is well-received across pragmatic qualities (efficiency, Perspicuity, and accuracy) and also performs adequately in hedonic aspects (attractiveness, stimulation, and novelty). Future researchers may assess knowledge levels, attitudes, and motivation regarding the educational media of animated films to promote behavioral change and prevent dental caries in children.

Keywords: educational media, animated films, promote behavioral, dental caries

INTRODUCTION

Oral and dental health is an inseparable part of physical health, as it affects the body as a whole. Despite this, oral health often receives insufficient attention, with many individuals perceiving dental conditions as relatively unimportant. Dental caries exerts an impact 15 times greater than other periodontal diseases when considered as a burden measured by Disability-Adjusted Life Years (DALYs) globally. In many countries, untreated caries in children lead to toothache, pulp diseases, abscesses, and fistulas, which adversely affect general health.¹ The World Health Organization (WHO) estimated in 2022 that nearly 3.5 billion people worldwide suffer from oral health problems. 3 out of 4 people affected

live in middle-income countries. Globally, an estimated 2 billion people suffer from permanent dental caries and 514 million children suffer from primary dental caries.²

Basic Health Research data indicate that the incidence of dental caries in Banten Province is 48.5%, with 52.35% of residents in Tangerang Regency experiencing dental decay, cavities, or pain. Other oral health issues, such as swollen gums or abscess formation, were reported at 20.88%.³ Lack of dental and oral hygiene in children is caused by a lack of understanding and awareness, both from themselves and their parents, regarding how to train children to brush their teeth regularly.⁴⁻⁷

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Traditional oral health education strategies, such as lectures and pamphlets, often lack appeal and cultural relevance for young children.⁸⁻⁹ In contrast, animated educational media especially those developed with cultural context in mind have proven more effective in engaging children and improving retention of health Messages.¹⁰⁻¹¹

Culturally based animation incorporates familiar symbols, language, attire, settings, and values, allowing children to identify with the characters and messages more deeply. This cultural alignment is essential to promote meaningful learning and sustained behavioral change.¹²⁻¹³

Through very useful health promotion, the population can improve, maintain and protect their health by increasing awareness, willingness and ability. From the data, the researcher is interested in conducting a program to provide animated films to increase knowledge of preventing dental caries in children.

METHODS

This study employed a mixed-methods design, combining both qualitative and quantitative approaches to comprehensively support the development of the animated film. The qualitative phase involved conducting in-depth interviews with doctor (informant 1), psychologist (informant 2), health promotion experts (informant 3), teachers (informant 4), and parents (informant 5) to perform a needs assessment related to promote behavioral change and prevent dental caries in children. The findings from this phase were used to guide the cultural and thematic content of the animated film. In the quantitative phase, the film was distributed to 35 fifth-grade students at MI Al-Barkah, selected using accidental sampling. The students received oral health education through the animated film. Subsequently, they were asked to complete User Experience Questionnaire (UEQ). Qualitative data were analyzed thematically, while quantitative data from the UEQ were analyzed descriptively to evaluate the acceptability and user experience of the animated film.

In the User Experience Questionnaire (UEQ), the mean value per item refers to the average score assigned by participants to each semantic differential item, measured on a 7-point Likert-type scale ranging from -3 (extremely negative) to +3 (extremely positive). Each item corresponds to one of six key dimensions of user experience: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. A mean score above +0.8 is generally interpreted as a positive evaluation; scores between -0.8 and +0.8 are considered neutral, while scores below -0.8 indicate a negative perception.¹⁴⁻¹⁶

Examining mean values at the item level provides a more detailed perspective on user responses, enabling researchers to identify specific aspects of a system or media product perceived either positively or negatively. This approach allows for a more nuanced interpretation

than relying solely on aggregate dimension scores, and offers valuable insights for enhancing usability, user engagement, and overall satisfaction.¹⁷⁻¹⁸

RESULTS AND DISCUSSION

Findings from In-depth Interviews on the Prevention of Dental Caries in School Children

1. The Importance of Maintaining Oral and Dental Health

"Dental caries is a disease caused by the accumulation of dental bacteria, leading to tooth damage and cavities due to poor oral hygiene practices such as infrequent tooth brushing and consumption of sugary foods. Children also need to understand the optimal times to brush their teeth and when to visit a pediatric dentist." (Informant 1)

"Some children are still treated for caries dentis, and parents report that their children are reluctant to brush their teeth and frequently consume sugary foods." (Informant 3)

2. Regarding the Educational Media Needed by Children

"The importance of appropriate and engaging educational media encourages children to brush their teeth more diligently and is expected to motivate regular dental check-ups without fear." (Informant 5)

"Engaging educational media can motivate children to brush their teeth and understand the significance of oral health. Selecting media appropriate for the target audience is crucial to ensure that the information and education are effectively conveyed. Suitable educational media is expected to enhance awareness about the importance of regular tooth brushing and dental visits." (Informant 4)

3. Regarding the Content of the Educational Media Needed by Children

"The choice of characters, colors, language, and storyline must attract children's interest so that they understand the educational content. The media should be visually appealing to engage children effectively." (Informant 2)

"The content should be as engaging and concise as possible. Attention must be paid to the vocabulary used, avoiding words that children might not understand. Ideally, the educational media should be illustrated with animated, lively, and entertaining characters, similar to the 'Nusa Rara' video series, to maintain children's interest and prevent boredom." (Informant 3)

From the results of the initial in-depth interviews with several informants, it can be concluded that maintaining oral and dental health is crucial in

preventing dental caries and tooth decay. The presence of appropriate educational media helps children become aware of the importance of oral and dental care. The development of such educational media should emphasize the importance of regular tooth brushing and should incorporate visual and animated elements. This type of media can enhance children's awareness of oral health maintenance. With clear and engaging information, the media can effectively assist children in understanding methods to prevent dental caries.

From the results of the second in-depth interview with several informants above, it can be concluded that the educational media designed by the researcher is very interesting because the educational media is an animated film about maintaining dental and oral health. The selection of words that are easy to understand,

adding props to demonstrate. The selection of design, color, and character must be appropriate for children. In addition, this educational media can be an effective tool for conveying health messages, so it is expected to encourage positive behavior in maintaining dental and oral health. This increase in knowledge has the potential to reduce the incidence of dental caries in the community.

Results of Content Concept Development and Animated Film Design

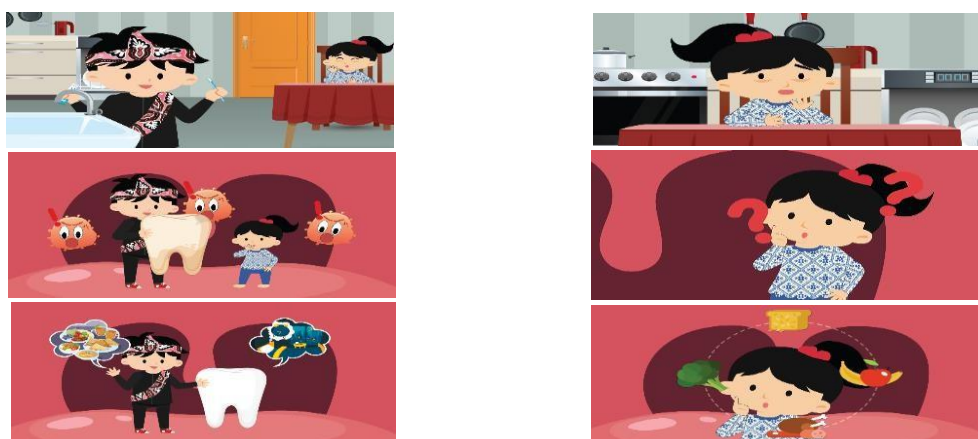


Figure 1. Animated Film Character (Jalu and Janis) Wearing Traditional Indonesian Batik and Demonstrating the Proper Tooth Brushing Technique

Based on the findings from the User Experience Questionnaire (UEQ), benchmarking results indicate that the animated film achieved an excellent rating across all evaluation criteria, as illustrated in the accompanying graph. The green area represents the top 10% of results, with the animated film categorized as excellent in all assessed aspects. Consequently, the

animated film is deemed ready for implementation and use among the respondents. According to the data collected by the researcher, the product developed in this study is an educational media collaboration utilizing the animated film evaluated through the UEQ method. The following figure 2 and 3 presents the benchmarking results from the data collection process.

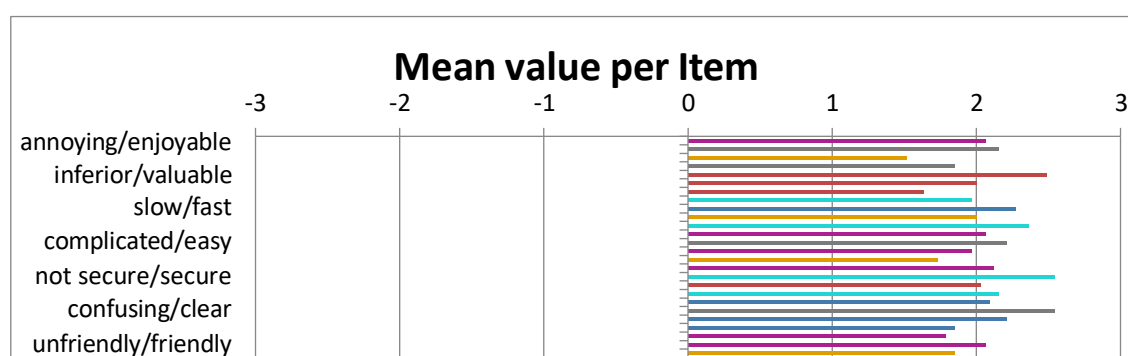


Figure 2. Mean Value per Item in User Experience Questionnaire (UEQ)

The table illustrates the mean scores and standard deviations for six core dimensions of user experience: Attractiveness, Perspicuity, Efficiency, Accuracy, Stimulation, and Novelty. These dimensions are evaluated based on the User Experience Questionnaire (UEQ) developed by Schrepp et al, which assesses both pragmatic and hedonic qualities of interactive systems.¹⁴

Attractiveness (M = 2.010, SD = 0.62): This dimension reflects the overall impression of the product, including how pleasant and appealing users find it. A mean score above 2 indicates a highly positive perception of the product's visual and emotional appeal. Perspicuity (M = 2.189, SD = 0.48): Perspicuity pertains to how easily users can understand and navigate the product. A relatively high mean with a moderate standard deviation suggests a consistent perception of the product as straightforward and user-friendly. Efficiency (M = 2.106, SD = 0.77) :Efficiency measures how quickly and effectively users can achieve their goals using the product. The score reflects a strong positive evaluation, though the slightly higher standard deviation implies some variation in user experiences. Dependability(M = 2.258, SD = 0.23):

This is the highest-rated dimension, indicating that users perceived the product as highly precise and reliable in delivering correct outputs or responses. The low standard deviation denotes a high level of agreement among users. Stimulation (M = 2.038, SD=0.49):Stimulation assesses how exciting and motivating the product is for users. The score suggests that the product successfully engages users, contributing to a positive emotional experience. Novelty (M = 1.773, SD=0.44): Novelty represents how innovative and creative the product is perceived. Although it received the lowest mean among the six dimensions, the score remains above the neutral point (0), indicating a generally favorable view, albeit less enthusiastic compared to other aspects.

Overall, the data indicates that the product provides a highly positive user experience, especially in terms of Dependability and Perspicuity. These results suggest that the product is well-received across pragmatic qualities (efficiency, Perspicuity, and accuracy) and also performs adequately in hedonic aspects (attractiveness, stimulation, and novelty)

Table 1. Benchmark Results Compared to Other Studies Recorded in The Data Analysis Tool (UEQ Data Analysis Tool via Microsoft Excel Office 365

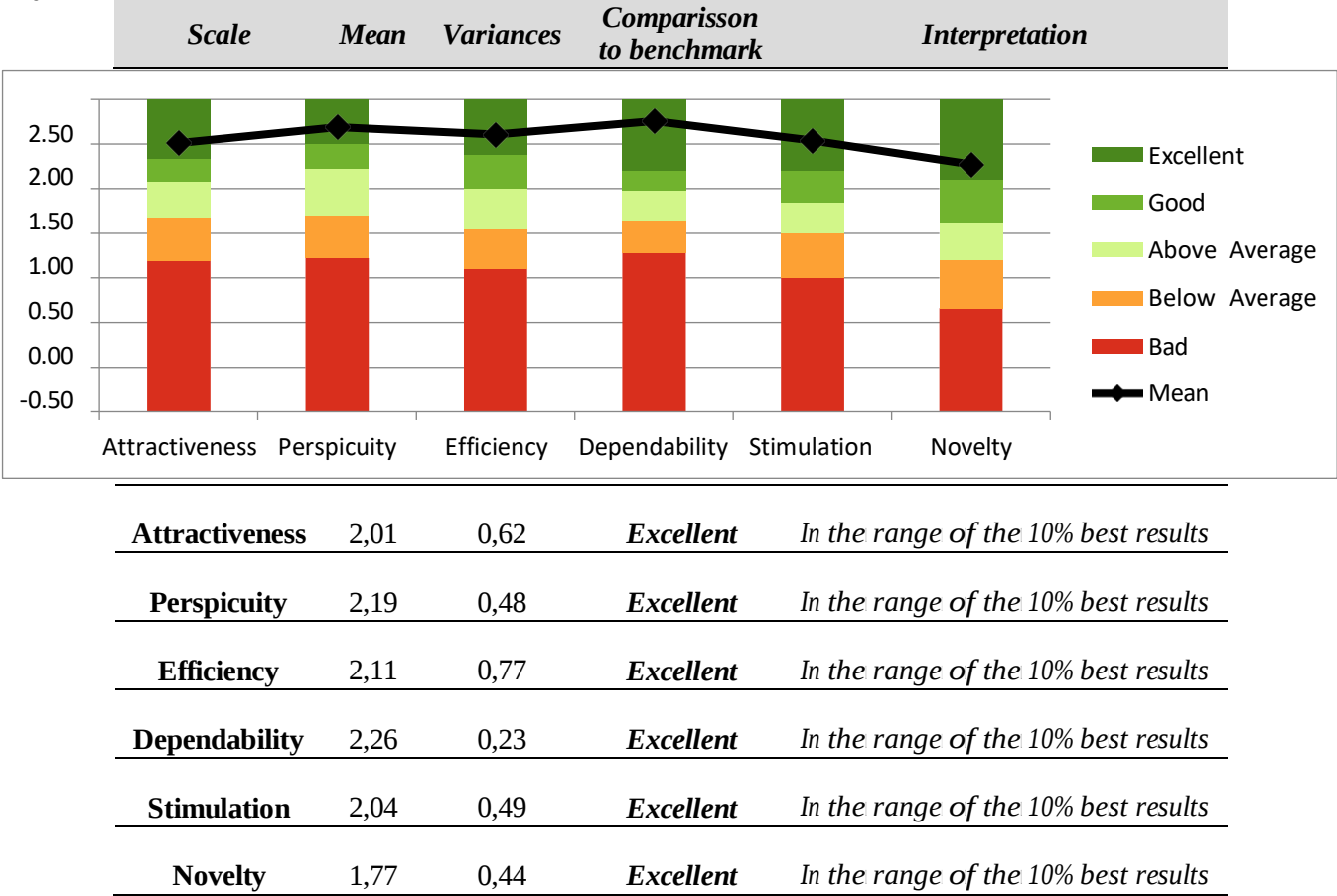


Figure 3. Benchmark Graph Presenting Research Findings on Various Aspects of User Experience, Derived From The Database Analysis Tool

Following the content development stage, the researcher conducted a trial to assess acceptability among 35 respondents using the User Experience measurement analysis (UEQ Data Analysis Tool via Microsoft Excel Office 365).

The table above shows that the feasibility analysis falls within category based on the following criteria:^{14,19}

1. Excellent: The evaluated product is among the top 10% of benchmarked results.
2. Good: 10% of benchmark results are better than the evaluated product, while 75% are worse.
3. Above Average: 25% of benchmark results are better than the evaluated product, while 50% are worse.
4. Below Average: 50% of benchmark results are better than the evaluated product, while 25% are worse.
5. Bad: The evaluated product is among the bottom 25% of benchmarked results.

According to the benchmarking results, the animated film ranks excellent in all evaluation aspects, as depicted in the graph. The green area indicates the top 10% of results, confirming the animated film's excellent status across all criteria. Therefore, the animated film is ready to be utilized and applied to the respondents. Based on the collected data, the product developed in this research is an educational media collaboration involving the animated film, assessed through the UEQ method.

The development of culturally based animated films represents an innovative approach to promoting behavioral change and preventing dental caries among children. These films use culturally familiar characters, languages, and environments to create engaging and relatable narratives that effectively teach oral health behaviors such as tooth brushing and reducing sugar intake. Recent studies have shown that animated educational videos are more effective than traditional methods in improving oral hygiene knowledge, attitudes, and practices among children.²⁰⁻²¹ For example, cartoon-based interventions have demonstrated significant reductions in plaque levels and better oral hygiene outcomes in school-aged children compared to pamphlet-based education.^{10,22}

Additionally, research highlights that co-designing such films with families and communities increases cultural relevance and message retention.²³ The integration of behavioral theories like Social Cognitive Theory in animated storytelling allows children to observe and imitate positive behaviors in a way that feels both natural and enjoyable.²⁴ Overall, these culturally grounded visual tools offer a promising method to foster long-term oral hygiene habits and reduce the prevalence of dental caries,

especially in populations where traditional health education may not be as effective.

CONCLUSION

Content production was successfully completed in collaboration with the editorial and animation teams for the creation of the educational media involving an animated film. Based on the identification results from informants, the main characters are two siblings named Jalu and Janis, designed to be visually appealing and age-appropriate, dressed in traditional batik attire. The feasibility analysis of the animated film product for preventing dental caries in school children, using the User Experience Questionnaire (UEQ), demonstrated excellent results across the aspects of attractiveness, Perspicuity, efficiency, accuracy, stimulation, and novelty.

DECLARATIONS

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Faculty of Public Health, Universitas Indonesia (Approval No. 122/KEPK-FKMUNEJ/2024). All participants gave their informed consent before taking part in the study.

Consent for publication

Not applicable. This study does not contain any individual data or images requiring consent for publication.

Competing interests

The authors declare no conflict of interest.

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