

Enhancing Paediatric Dental Preparation Through AI-Assisted Bilingual Storytelling: A Preliminary Quantitative Evaluation of Mouth Ville

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ABSTRACT

Dental anxiety and uncooperative behaviour can complicate dental treatment among young children. Conventional preparatory materials may provide information but may not adequately address children's need for engaging, developmentally appropriate, and emotionally supportive preparation. This study aimed to evaluate the preliminary effects of Mouth Ville: An Animated Journey of Happy Teeth, an artificial intelligence (AI)-assisted bilingual storytelling intervention, on dental anxiety and observable cooperative behaviour among paediatric patients undergoing dental extraction. A quantitative single-group pre-post pilot study was conducted among 10 paediatric patients aged 5–6 years. The research team developed Mouth Ville using an AI-assisted multimedia production workflow that incorporated bilingual storytelling, animated visual content, and synthetic narration, with clinical and pedagogical oversight. Dental anxiety was assessed before and after exposure to the intervention using the six-item Malay Modified Child Dental Anxiety Scale–Faces version (Malay-MCDAS(f)), while observable cooperative behaviour was assessed using the Frankl Behaviour Rating Scale. Pre-post differences were analysed using the Wilcoxon signed-rank test. Mean MCDAS(f) scores decreased from 18.1 ± 1.91 before the intervention to 12.7 ± 2.00 after exposure, with all participants demonstrating reduced scores ($W = 0$, exact $p = 0.002$). Mean Frankl scores increased from 2.0 ± 0.00 to 3.2 ± 0.63 , with 80% of participants demonstrating improved behaviour ($W = 0$, exact $p = 0.004$). These preliminary findings suggest that AI-assisted bilingual storytelling may support paediatric dental preparation; however, the small sample and absence of a control group limit causal inference. Larger controlled studies are warranted to establish effectiveness and longer-term outcomes.

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1. INTRODUCTION

Early childhood is a critical period for establishing healthy oral hygiene practices and reducing dental fear. Globally, early childhood caries remains highly prevalent, affecting nearly 53% of preschoolers (Uribe et al., 2021). Poor oral hygiene in young children often leads to pain, systemic infections, impaired nutrition, and dental anxiety. However, traditional educational approaches, such as printed brochures or conventional cartoon videos, have shown limited success in improving long-term health outcomes. Furthermore, dental anxiety among preschoolers poses a persistent challenge (Alsaadoon et al., 2022). Effective learning in this age group requires engaging, age-appropriate strategies that capture children's attention while mitigating anxiety about unfamiliar experiences (Alsaadoon et al., 2022). Storytelling has long been recognised as a powerful pedagogical tool in early childhood education, capable of conveying complex information in an approachable, memorable way. With recent advancements in artificial intelligence (AI), storytelling can now be personalised and dynamically enhanced, giving rise to AI-powered educational interventions in healthcare. This paper explores AI-assisted storytelling in early childhood dental education. Specifically, it examines traditional educational methods and their limitations, discusses the pedagogical role of narrative-based learning, reviews emerging frameworks leveraging AI for health narratives, and synthesises evidence on how technology-assisted storytelling reduces dental anxiety while enhancing knowledge retention. Based on these findings, we discuss how AI-powered storytelling could transform paediatric dental health education and offer implications for future educational practice and health policy.

2. LITERATURE REVIEW

2.1 Paediatric Dental Anxiety and Behaviour Preparation

Dental anxiety is a common challenge in paediatric dental care. It may negatively influence children's willingness to attend dental appointments, cooperate during treatment, and develop positive attitudes towards future dental experiences. Early childhood is therefore an important period to introduce children to oral healthcare through approaches that are both educationally appropriate and emotionally supportive. Conventional approaches to prepare children for dental visits include verbal explanation, printed materials, demonstrations and behavioural guidance techniques such as tell-show-do. Although these approaches remain important components of paediatric dental care, their effectiveness may depend on the child's age, developmental level, previous dental experience and ability to understand unfamiliar clinical situations (Alsaadoon et al., 2022).

Traditional educational materials such as posters, leaflets and static illustrations generally provide information in a fixed format. While these resources can communicate basic oral-health messages, they may not adequately address children's emotional responses to unfamiliar dental procedures. Furthermore, conventional pre-recorded videos provide visual and auditory information but generally present a predetermined narrative that cannot be readily adapted to individual children's needs. Ginting et al. (2024) highlighted the potential of digital storytelling to improve learning outcomes compared with conventional didactic video approaches, suggesting that the narrative structure through which information is presented may influence engagement and retention.

For paediatric dental preparation, making an unfamiliar experience more foreseeable may be particularly important. Children may experience anxiety because they do not know what will happen during a dental visit or how they are expected to respond. Preparatory interventions that explain dental experiences in a familiar, understandable way may therefore reduce uncertainty and support more positive behaviour. Alsaadoon et al. (2022) reported in a randomised controlled clinical trial that children exposed to a dental storybook showed lower dental anxiety and improved cooperation compared with children who did not receive the storybook intervention. Similarly, Gozin et al. (2022) reported favourable anxiety outcomes following an audiovisual storytelling intervention among children receiving dental treatment.

These findings support using developmentally appropriate preparation as a complementary component of paediatric behaviour guidance. However, preparation effectiveness depends not only on the information presented but also on how it is communicated. For young children, educational resources that combine narrative, visual representation, and emotionally supportive content may provide a more engaging way to introduce unfamiliar dental experiences.

2.2 Storytelling and Digital Learning in Paediatric Dentistry Education

Storytelling has long been used as a pedagogical approach in early childhood education because narratives can present information through characters, events and emotions that are meaningful to young learners. Rather than presenting isolated facts or instructions, storytelling places information within a sequence of events that children can follow and remember. Yabe et al. (2018) demonstrated that listening to stories produced sustained activation of children's prefrontal regions compared with picture-book reading, supporting the potential of narrative-based communication to promote active engagement.

The educational value of storytelling may also arise from its ability to provide children with models of behaviour. A character who demonstrates positive behaviour during a dental visit can provide a simple example for children to observe and potentially imitate. This is consistent with social learning principles, in which behaviour can be acquired through observation and modelling. In paediatric dentistry, a story character who approaches a dental visit positively may help reframe the experience from something associated with fear to something understandable and manageable.

Storytelling may also support emotional preparation. Dental procedures can involve unfamiliar sights, sounds and sensations that may be difficult for young children to anticipate. A narrative instrument can introduce these experiences in a structured sequence, helping children understand what may occur before they enter the clinical environment. Alsaadoon et al. (2022) demonstrated the potential clinical relevance of this approach, reporting reduced dental anxiety and improved cooperation among children who received a preparatory dental storybook. Gozin et al. (2022) similarly found that audiovisual storytelling could reduce dental anxiety among children compared with conventional preparation.

Digital storytelling extends these principles by combining narrative with animation, sound, narration and visual cues. These multimodal features may suit young children, who may respond more readily to visual and auditory communication than to text-based educational materials. Digital storytelling can also provide greater flexibility in content production and distribution than conventional printed materials. Liu et al. (2022), as cited in the existing manuscript, described the potential of digital storytelling to enhance children's interest, understanding and recall through the integration of narrative and visual elements.

Evidence from oral-health education further supports using animated and narrative-based media. Sari et al. (2025) reported improvements in dental and oral-health behaviours following an animated-video educational intervention among elementary school children. Although such findings should not be directly equated with reductions in dental anxiety, they suggest that engaging audiovisual formats can support children's participation in oral-health education.

Importantly, storytelling should not be regarded as a replacement for established clinical behaviour guidance. Instead, it can function as a preparatory educational resource that complements dentist-child communication, modelling, positive reinforcement and other appropriate behaviour guidance techniques. Its potential value lies in introducing children to dental concepts and experiences in a familiar format before or alongside direct clinical interaction.

2.3 AI-Assisted Storytelling and the Research Gap

Recent developments in generative artificial intelligence (AI) have expanded the possibilities for producing digital educational content. AI-assisted tools can support several stages of multimedia development, including script drafting, visual asset generation and synthetic voice narration. These capabilities may reduce the time and resources traditionally required to develop animated educational materials, allowing educators to combine narrative, visual, and auditory elements within a single resource.

The emerging application of AI to healthcare education has also been discussed in relation to graphic medicine and visual health communication. Dutta et al. (2025) described how AI-based language and image-generation technologies may support developing visual narratives for healthcare education. These applications highlight AI's potential to help produce accessible, visually engaging health-education materials. However, using AI in health education requires appropriate human oversight because automatically generated content may need verification for accuracy, appropriateness, and contextual relevance.

This consideration is particularly important in paediatric dental education. Educational content for young children must be clinically accurate while remaining developmentally appropriate, emotionally supportive and culturally relevant. Consequently, AI should be viewed as a production and creative-support technology rather than an autonomous source of clinical information. Human expertise remains essential to set educational objectives, review clinical content, and ensure the final resource suits its intended audience.

Bilingual digital resources may offer an additional advantage in multilingual educational and healthcare environments. Providing content in both Malay and English can potentially improve accessibility for children and families with different language preferences while maintaining consistent educational messages. However, bilingual development should involve more than direct translation; the language, narrative and visual content should remain understandable and culturally appropriate for the target population.

Despite growing interest in AI-assisted educational technologies, the literature offers more evidence on storytelling and digital education generally than on empirical evaluation of AI-assisted storytelling specifically as a preparatory intervention in paediatric dentistry. Existing studies have shown benefits of dental storybooks and audiovisual storytelling (Alsaadoon et al., 2022; Gozin et al., 2022), while emerging work has explored AI-supported animated content in paediatric dental behaviour management (Vitale et al., 2025). However, research still needs to examine how AI-assisted production can integrate with established pedagogical principles and clinically supervised content development to produce practical, child-centred resources.

Mouth Ville: An Animated Journey of Happy Teeth was developed to address this opportunity. Rather than positioning AI as an autonomous educator, the intervention uses AI-assisted multimedia production under clinical and pedagogical oversight to create a bilingual animated storytelling resource for young children undergoing dental treatment. The present study therefore moves beyond describing the development of an AI-assisted educational product by providing a preliminary quantitative evaluation of its potential association with changes in dental anxiety and observable cooperative behaviour.

3. METHODOLOGY

3.1 Product development

Mouth Ville: An Animated Journey of Happy Teeth was developed using design thinking principles and the ADDIE (Analysis, Design, Development, Implementation and Evaluation) framework. The development process combined child-centred narrative learning with clinically appropriate paediatric dental content.

During the analysis phase, we identified the need for an engaging, developmentally appropriate resource to prepare young children for dental experiences. During the design phase, dental and oral-health concepts were translated into a child-friendly narrative structure that incorporated familiar characters, positive emotional cues, and representations of common dental experiences. During development, AI-assisted tools supported script development, visual asset generation, and bilingual narration.

OpenArt and Canva were used to develop characters, illustrations and visual scenes. Malay and English narration was generated using ElevenLabs, while CapCut was used to integrate visual content, narration, sound effects, transitions and pauses into the final animation. Paediatric dentistry professionals reviewed the clinical content for accuracy, developmental appropriateness, and relevance to common dental experiences. AI was used as a production and creative-support tool, not as an autonomous source of clinical decision-making.

3.2 Study design and participants

A quantitative single-group pre-post pilot study was conducted to preliminarily evaluate the effects of Mouth Ville: An Animated Journey of Happy Teeth, an artificial intelligence (AI)-assisted bilingual storytelling intervention developed for paediatric dental preparation. The study comprised two linked phases: developing the digital educational resource and preliminarily evaluating its immediate effects on dental anxiety and observable cooperative behaviour.

We obtained parental informed consent from all participants before participation. Ten paediatric patients aged 5–6 years scheduled for dental extraction participated in the pilot evaluation. The sample comprised five boys and five girls. Six participants had previous dental visits, while four had none. All participants were assessed using the same outcome measures at the specified pre- and post-intervention time points.

As a preliminary pilot study, we selected a single-group pre–post design to explore the feasibility and potential effects of the intervention before undertaking a larger controlled evaluation. Without a control group, observed changes cannot be attributed exclusively to Mouth Ville.

3.3 Intervention and assessment procedure

Participants were assessed at two main time points: T0 (baseline), before exposure to Mouth Ville and dental treatment, and T1 (post-treatment), immediately after completion of the dental extraction.

At T0, we recorded demographic characteristics and previous dental experience. Dental anxiety was assessed using the six-item Malay Modified Child Dental Anxiety Scale–Faces version (Malay-MCDAS(f)). A designated assessor, who was not the operator performing the dental procedure, assessed observable cooperative behaviour using the Frankl Behaviour Rating Scale.

After the baseline assessment, each participant watched Mouth Ville: An Animated Journey of Happy Teeth as a preparatory educational intervention before the planned dental extraction. The bilingual animated story was designed to familiarise children with dental experiences through child-friendly narrative, visual representation and positive behavioural modelling.

Immediately after completion of the dental extraction, the Malay-MCDAS(f) was administered again to assess post-treatment dental anxiety. The same designated assessor who performed the baseline behavioural assessment also reassessed the Frankl Behaviour Rating Scale. The assessor was not the operator responsible for the dental procedure. This procedure allowed changes in self-reported dental anxiety and observable cooperative behaviour to be examined between baseline and immediately after treatment.

3.4 Outcome measures

3.4.1 Dental Anxiety

Dental anxiety was assessed using the Malay Modified Child Dental Anxiety Scale–Faces version (Malay-MCDAS(f)) (Esa et al., 2015). We used the validated six-item version for young children. Each item is scored from 1 to 5, with higher scores indicating greater dental anxiety, producing a total score ranging from 6 to 30. The same validated instrument was administered at T0 and T1. The change in total score was calculated as post-intervention score minus baseline score, with a negative value indicating a reduction in dental anxiety.

3.4.2 Cooperative Behaviour

Observable cooperative behaviour was assessed using the Frankl Behaviour Rating Scale, which categorises behaviour into four levels: Frankl 1 (definitely negative), Frankl 2 (negative), Frankl 3 (positive), and Frankl 4 (definitely positive). Baseline behaviour was assessed before exposure to Mouth Ville, while post-intervention behaviour was assessed following dental treatment. Higher scores represent more positive cooperative behaviour.

3.5 Statistical Analysis

Data were analysed using descriptive and inferential statistics. Participant characteristics were summarised using frequencies and percentages. Continuous outcome scores were summarised using means and standard deviations, and medians and interquartile ranges were also reported because of the small sample size and the ordinal nature of the outcome measures.

Changes in Malay-MCDAS(f) and Frankl Behaviour Rating Scale scores between the respective pre- and post-intervention assessments were analysed using the Wilcoxon signed-rank test for paired observations. Statistical significance was set at $p < 0.05$. Exact two-sided p-values were reported because of the small sample size.

4. RESULTS & DISCUSSION

4.1 Participants characteristics

Ten paediatric patients aged 5–6 years participated in the pilot evaluation. The sample comprised five boys (50%) and five girls (50%), with five participants aged 5 years and five aged 6 years. Six participants (60%) had previous dental experience, while four (40%) had no previous dental visit. All participants were scheduled for dental extraction. Table 1 summarises these characteristics.

Table 1 Characteristics of participants

Characteristic	n	%
Age		
5 years	5	50
6 years	5	50
Sex		
Male	5	50
Female	5	50
Previous dental visit		
Yes	6	60
No	4	40
Total	10	100

4.2 Dental Anxiety

A reduction in self-reported dental anxiety was observed between baseline and immediately following completion of the dental procedure. The mean Malay-MCDAS(f) score decreased from 18.1 ± 1.91 at baseline to 12.7 ± 2.00 post-treatment, representing a mean reduction of 5.4 points. The median score decreased from 17.5 (IQR 17.0–19.5) to 12.5 (IQR 11.25–14.75). All 10 participants demonstrated a reduction in their individual MCDAS(f) score. The Wilcoxon signed-rank test indicated a statistically significant difference between baseline and post-treatment scores ($W = 0$, exact $p = 0.002$).

The observed reduction provides preliminary evidence of a favourable change in children's self-reported dental anxiety across the study period. Using the Malay-MCDAS(f) strengthens the assessment because it provides a validated, child-centred measure appropriate for young children. The six-item Malay version has previously demonstrated acceptable reliability and validity among Malaysian children, supporting its use in this population.

Table 2 Changes in Dental Anxiety Pre- and Post-Intervention

Outcome	Pre-intervention	Post-intervention	Wilcoxon W	Exact p-value
Malay-MCDAS(f), mean $\pm$ SD	18.1 ± 1.91	12.7 ± 2.00	0	0.002
Median (IQR)	17.5 (17.0–19.5)	12.5 (11.25–14.75)		

The finding is also broadly consistent with previous research examining storytelling as a preparatory approach in paediatric dentistry. Alsaadoon et al. (2022) reported lower dental anxiety and improved cooperation after using a preparatory dental storybook, while Gozin et al. (2022) reported favourable anxiety outcomes after audiovisual storytelling. These studies provide a relevant basis for interpreting the present findings because they similarly use narrative or audiovisual approaches to make dental experiences more familiar to children.

Storytelling may be particularly useful because it presents an unfamiliar experience as a sequence of understandable events. In Mouth Ville, dental experiences are embedded in a child-oriented narrative that incorporates characters, visual scenes, and positive behavioural cues. Such narrative structure may help children anticipate what they are likely to encounter and reduce uncertainty surrounding the dental setting. The visual and auditory format may further support comprehension among young children who may have limited ability to process conventional text-based health information.

However, the timing of the post-intervention assessment is important when interpreting the magnitude of the observed change. MCDAS(f) was administered immediately after completion of the dental extraction rather than immediately after viewing the animation. Therefore, the anxiety reduction cannot be attributed solely to Mouth Ville. The child's experience during treatment, communication with the dental team, parental presence, familiarity with the clinical environment and other behavioural management strategies may also have contributed to the post-treatment score. Accordingly, the present findings should be interpreted as a preliminary association between exposure to Mouth Ville within the treatment sequence and subsequent changes in dental anxiety, rather than evidence of a causal treatment effect.

An exploratory item-level observation was also identified. All six MCDAS(f) items demonstrated lower mean scores following the intervention and dental treatment. The extraction-related item had the highest mean score at both baseline and post-treatment assessment (4.7 and 4.2, respectively), indicating that extraction remained the most anxiety-provoking aspect for these participants. This observation is clinically plausible given that all participants were undergoing extraction. The persistence of relatively high extraction-related anxiety may suggest that general dental preparation does not necessarily address procedure-specific fears. However, this finding was descriptive only and should be interpreted cautiously because of the small sample and absence of separate item-level hypothesis testing.

The finding provides a useful direction for future MouthVille development. A procedure-specific version could provide more explicit preparation for extraction while maintaining age-appropriate and reassuring language. Such content should balance preparation with avoiding unnecessary anticipatory fear.

4.3 Cooperative Behaviour

Observable cooperative behaviour also improved between baseline and post-treatment assessment. At baseline, all 10 participants (100%) were rated Frankl 2 (negative behaviour). Following dental treatment, one participant (10%) remained at Frankl 2, six participants (60%) were rated Frankl 3 (positive behaviour), and three participants (30%) were rated Frankl 4 (definitely positive behaviour). Overall, nine participants (90%) improved their Frankl score, while one participant (10%) showed no change. No participant demonstrated deterioration in behaviour. The mean Frankl score increased from 2.0 ± 0.00 at baseline to 3.2 ± 0.63 post-treatment, while the median increased from 2.0 to 3.0 (IQR 3.0–3.75). The Wilcoxon signed-rank test demonstrated a statistically significant difference between the paired assessments ($W = 0$, exact $p = 0.004$).

Table 3 *Changes in cooperative behaviour Pre and post-intervention*

Outcome	Pre-intervention	Post-intervention	Wilcoxon W	Exact p-value
Frankl, mean $\pm$ SD	2.0 $\pm$ 0.00	3.2 $\pm$ 0.63	0	0.004
Median (IQR)	2.0 (2.0–2.0)	3.0 (3.0–3.75)		

Table 4 *Distribution of Frankl Behaviour Ratings at Baseline and Post-Treatment*

Frankl category	Baseline n (%)	Post-treatment n (%)
Frankl 2 – Negative	10 (100)	1 (10)
Frankl 3 – Positive	0	6 (60)
Frankl 4 – Definitely positive	0	3 (30)
Total	10 (100)	10 (100)

The shift towards more positive behavioural ratings is encouraging because cooperation is an important practical consideration when delivering dental treatment to young children. The findings are broadly consistent with previous studies suggesting that narrative and audiovisual preparation may support children's cooperation during dental care (Alsaadoon et al., 2022; Gozin et al., 2022).

Nevertheless, Frankl behaviour and dental anxiety should not be considered as interchangeable outcomes. The Frankl Behaviour Rating Scale assesses observable behaviour, whereas the Malay-MCDAS(f) assesses the child's self-reported dental anxiety. A child may experience anxiety while still cooperating with treatment, and observable behaviour can be influenced by factors such as temperament, previous dental experience, clinician communication and parental behaviour.

The interpretation of the Frankl findings therefore requires particular caution. The post-treatment rating was obtained after both exposure to Mouth Ville and completion of the dental extraction. Although the same assessor performed the baseline and post-treatment ratings and was not the operator performing the extraction, the study did not include an independent control condition or blinded behavioural assessment. Consequently, the observed improvement cannot be attributed solely to Mouth Ville. Future controlled studies should separate the effect of the digital preparation from the effects of routine behavioural management and the dental procedure itself.

4.4 Educational and Technological Significance

These initial observations provide preliminary evidence that AI-augmented narrative methods are a valuable adjunct for preparing paediatric patients for dental care. The scholarly merit of Mouth Ville extends beyond the mere technical application of machine intelligence for animation; it represents a systematic fusion of automated multimedia workflows with child-focused pedagogical narratives and rigorous clinical supervision.

Throughout the development cycle, automated systems assisted with draft script generation, illustrative design, and dual-language vocal synthesis, but human specialists maintained all pedagogical and clinical oversight. This clinician-led framework is vital, as adopting generative technologies in medical instruction should enhance rather than replace professional expertise. Consequently, AI acts as a catalyst for material production and customisation, while educators remain the primary arbiters of clinical precision and developmental suitability.

The integrated Malay and English dual-language interface potentially broadens the reach of this intervention across diverse linguistic landscapes. By moving beyond reliance on static text, Mouth Ville uses synchronised vocalisation, visual movement, and story sequencing to convey dental principles through a medium better suited to preschool cognitive levels. Furthermore, its electronic distribution facilitates repeated engagement across various settings, such as pre-appointment home viewing, clinical waiting areas, or formal school-based oral health programs.

Mouth Ville is intended as a supplementary preparatory resource, not a replacement for validated paediatric behaviour management strategies. Interpersonal techniques, including tell-show-do, positive reinforcement, and effective modelling, remain fundamental to the clinical encounter. This digital tool can prime the paediatric patient before implementing these direct clinical guidance methods.

The current findings also indicate opportunities for expanding both procedural scope and linguistic diversity. A modular architecture could support specialised narratives for extractions, diagnostic imaging, anaesthesia, or restorative care. Additional language variants could be introduced, provided dental professionals thoroughly validate translation nuances and cultural context. While automated workflows streamline this adaptive process, the clinical integrity of the instructional content still requires comprehensive human verification.

4.5 Limitations and Future Directions

Several limitations should be considered when interpreting the findings. First, the study involved only 10 participants, limiting statistical power and generalisability. Second, the single-group pre–post design did not include a control or comparison group; therefore, the observed changes cannot be attributed solely to Mouth Ville. Third, the study assessed both post-treatment outcomes immediately after dental extraction. This means that the study cannot distinguish the contribution of the storytelling intervention from the effects of the dental procedure, clinician interaction and other behavioural management strategies. Fourth, the study evaluated immediate changes and did not determine whether reductions in anxiety or improvements in behaviour were sustained during subsequent dental visits.

The Frankl assessment also represents an observer-rated measure of behaviour rather than a direct measure of internal anxiety. Although the same assessor rated participants at both time points and was not the treatment operator, assessor awareness of the intervention could not be excluded. In addition, the study did not evaluate children’s or parents’ acceptability, knowledge acquisition, longer-term oral-health behaviour or the effect of repeated exposure to the intervention.

Future research should therefore use larger controlled samples, ideally with randomisation and a comparison group receiving standard behavioural preparation. A future study should also consider assessing MCDAS(f) immediately after the storytelling intervention and again following treatment. This would allow the digital intervention’s immediate contribution to be distinguished more clearly from changes occurring during the dental procedure. Repeated follow-up assessments could determine whether any improvement in anxiety is maintained at subsequent appointments.

Future studies could additionally examine intervention acceptability, child engagement, parental perceptions, knowledge acquisition and treatment completion. Procedure-specific versions of Mouth Ville, particularly for extraction and local anaesthesia, should be evaluated separately. As AI-assisted educational production becomes more widespread, future research should also examine clinical accuracy, cultural and linguistic appropriateness, transparency of AI involvement, intellectual-property considerations, data governance and the continued role of professional oversight.

5. CONCLUSION

This preliminary pilot evaluation suggests that Mouth Ville: An Animated Journey of Happy Teeth, an AI-assisted bilingual storytelling intervention, has potential as a complementary approach to paediatric dental preparation. After exposure to the intervention and completion of dental treatment, participants showed a significant reduction in self-reported dental anxiety and improved observable cooperative behaviour. The findings highlight the potential of combining child-centred storytelling, bilingual multimedia content and AI-assisted production to develop engaging digital resources for paediatric dental education. However, the small sample size, single-group pre–post design, lack of a control group, and timing of the post-treatment assessment limit causal interpretation. Mouth Ville should therefore be considered a promising preliminary educational innovation rather than a proven behavioural intervention. Larger controlled studies with immediate post-intervention and longer-term assessments are warranted to determine its effectiveness, acceptability and applicability across different paediatric dental procedures and populations.

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8. AUTHORS' CONTRIBUTIONS

Azwin Assilah Kamaruddin: Conceptualisation, writing – review and editing, validation; Mohamad Afiq Farhan Bin Roslan: Conceptualisation, writing – review and editing, validation; Fariza Md Kassim: Conceptualisation, methodology, formal analysis, writing; Norsheridah Mahmood: Methodology, formal analysis and writing; Nur Nazihah Muhammad Hanafiah: Methodology, formal analysis, and writing.

9. CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication, nor has it been published in whole or in part elsewhere. We confirm that all authors contributed significantly to the work, the validity and legitimacy of the data, and its interpretation for submission to IJELHE.

10. DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation of this work, the author(s) used Gemini (Google) to assist with academic copyediting, improving language flow, and refining grammar. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

11. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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