ORIGINAL ARTICLE

Design and Usability Testing of a Web-Based Intervention Module for Obesity: CoPT Nutri Trail

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ABSTRACT

INTRODUCTION: Online interventions have emerged as innovative solutions to address health issues, notably obesity, while minimizing the necessity for in-person interactions during the recent COVID-19 pandemic. There is urgency in designing and developing an appropriate online intervention module within a web-based application. This study aims to describe the design process and usability of the online Canteen Operators, Parents, and Teachers (CoPT Nutri Trail) module for an upcoming school-based obesity intervention. **MATERIALS AND METHODS:** The design methodology consists of four phases: content development, design, web app development, and usability testing. The web application was designed to personalize usage for teachers, parents, and canteen operators to foster healthy environments for children. Thirteen experts, including teachers, nutritionists, and IT professionals, participated in the usability testing. **RESULTS:** All experts agreed that the design of the web application met the requirements of target users, requiring slight improvements in graphic design, language, and information elements. The web application tool was found acceptable, as the usability of alpha scores for all interface elements ranged from 68.2% to 86.6%, falling between good and very good scores. The content validation indices indicate good levels of validity (ranging from 0.83 to 1.00). **CONCLUSION:** The CoPT Nutri Trail web application is ready to be launched as a school-based intervention for obesity.

Keywords
Obesity Module Design, Web-based Intervention, Usability Testing

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INTRODUCTION

The worldwide spread of COVID-19 has had a detrimental effect on human social structures. For example, increased physical inactivity and unhealthy eating habits have led to worsening rates of obesity in all age groups, especially among children.[1] Obesity is one of the most significant predictors for the development of chronic diseases.[2,3] Thus, numerous interventions have been implemented in various settings to combat obesity. Most are primarily focus on the school setting, which is considered ideal for obesity prevention.[4] Schools provide a simple way to impact children's eating habits by reaching children, parents, and teachers. Thus, interventions promoting healthy lifestyles in schools seem logical, given their high compliance rates compared to other settings.[5]

Nevertheless, the outcomes of such studies in different parts of the world, including Malaysia, have yielded mixed results depending on various factors, including the module used, the duration, the delivery method used, and the intensity of the intervention.[6,7] In addition, previous intervention modules were usually print-based and made limited use of technologies and the activities within each module were conducted face-to-face manner with the target group.[8,9,10,11] Given the current circumstances, there is a growing need for more online interventions that can adapt to and better reach the target population. For example, web-based interventions for individuals who are overweight or obese emerged as a new option[12,13,] coinciding with increased usage of the

internet across generations in recent years.[14] Due to their easy accessibility, fast response, wider reach, and cost-effectiveness, new technologies have become indispensable tools in daily life and may contribute to higher adherence rates.[15,16] Hence, web-based interventions present a novel approach to managing health issues such as obesity.[17] To date, numerous online obesity modules have been developed for use on social media platforms, smartphone applications, and video games targeting obese children as users, allowing them to participate independently and anonymously from home.[16,18,19] However, attention from the school community is crucial, as evidence has shown that programs involving the entire school community have proven more effective in improving children's lifestyle to prevent obesity than interventions solely targeting children.[20]

Most interventions using the school community strategy usually take place in a face-to-face setting and rely on printed materials to facilitate the activities. In addition, these interventions often extend over a year to effectively influence behaviour change.[21,22,23] As a result, these interventions face challenges such as time constraints for teachers who must prioritise their primary school curricula for teaching, and the willingness of parents to participate despite their existing commitments. Therefore, designing a web-based obesity module is must focus on the school community's needs, allowing them to access information conveniently at their preferred time and place, along with carefully curated intervention components.[24]

Thus, the aim of this web-application-based online module is to promote self- learning among school community to modify children's eating habits. Designing the website is crucial and likely to influence the engagement of target users. As such, several factors must be carefully revised, including content, navigation, visual design, user-friendliness, interaction, and the accessibility of information.[25]

Thus, the study aims to describe the website design and the features of the newly developed CoPT Nutri Trail to be used by teachers, parents, and school canteen operators as a school-based intervention for obesity.

MATERIALS AND METHODS

The web-based CoPT Nutri Trail is an acronym for Canteen Operator (Co), Parents (P), and Teachers (T) Nutrition Module. It is an online module designed for canteen operators, parents, and teachers to facilitate and carry out the intervention activities involving behavioral lifestyle changes for children and a guide to promote a healthy environment at school and home. This module was designed using the website platform as a domain to serve the content through the specific creation of a user's account that involved four stages, as shown in Figure 1.

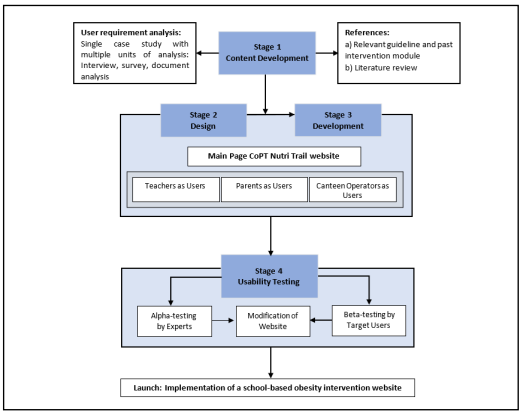

Figure 1: The Design and Development Process of the CoPT Nutri Trail Website

Stage 1: Content Development

The website content should be moderately structured, well-planned, and include relevant and attractive words to attract the target users. We employed a qualitative single case study with multiple units of analysis to identify the requirements for a website prototype and to specify the contents for each user. Multiple units of analysis were utilized, including interviews, document analysis, and surveys. Six teachers and nutritionists with prior experience in implementing obesity interventions in their respective schools were interviewed. Document analysis was conducted based on post-intervention data. Additionally, a survey was distributed to teachers, school canteen operators, and parents to gather feedback on a newly developed online module intended for future intervention studies. The detailed process was discussed in a previous study.[24] In addition to the requirement analysis, an extensive literature review was conducted to develop the structured content of the module. The final content of the website is presented in Table I.

Table I: Content Creation for CoPT Nutri Trail Website: Findings from User Requirement Analysis

Design Concept for the Target User	Teachers	Parents	School Canteen Operators
a) Findings from user requirement analysis for content development	1: Suggest simple activities (nutrition & physical activity) for students that can be implemented by teachers 2: Provide information/ guideline on nutrition to teachers to promote healthy changes in the school environment 3: Provide teachers with interactive materials/kits (e.g., games/ quizzes for students either for face-to-face or online classes)	1: Parents can monitor their child's weight and Body Mass Index (BMI) 2: Provide parents with ideas/menu that are simple to prepare, quick, healthy, affordable, attractive, and delicious for their kids 3: Provide awareness to parents on obesity, high-calorie food, serving size, and food labelling	1: Provide ideas/ options to canteen operators to prepare healthy meals that are allowed in school 2: Provide tips on recipe modification 3: Prepare simple, quick, healthy, and affordable menu items 4: Provide awareness on drinks/foods with high calories
b) Final constructs for each content developed based on objectives, catchy titles, simplicity, attractiveness, and usefulness	A: Teacher's Checklist B: BMI Monitoring C: Nutri Game D: Nutri Info E: Intervention Manual F: Download Materials	A: Obesity B: Get to Know Your Child's BMI C: Kids Healthy Plate D: Calorie Alert E: Quick Recipes F: Physical Activity G: Knowledge Check H: Download Materials	A: 7 Steps to Keep the School Canteen Healthy B: Yes and No C: Nutri Info D: Ideas E: Food Hygiene and Safety F: Knowledge Check G: Download Materials
c) Platform usage (Application of ease of use and usefulness)	WhatsApp, Telegram, can be downloaded and stored as softcopy if there are issues with internet connection	Use of social media such as Facebook, WhatsApp, Telegram	Website or links to print material if limited time/budget for internet server
Development of CoPT Nutri Trail as a web-based platform for target users			

Stage 2: Design of the Website

In this stage, we emphasized the features of website design that include navigation, visual design or appearance, content with the relevance message, information accessibility, web-friendly, interaction, authentication page, and profile, as well as a mobile version as part of responsive so that the target users can visit it on their devices at any time. The software program and website dimension were all used to accommodate these design features throughout the design process.

Application of Appropriate Software

The initial stage of website design involves creating a storyboard for all the target users using Microsoft PowerPoint. Subsequently, interactive infographics were created using tools like Canva Pro. These infographics were intended to be incorporated into website pages and shared with users in the form of flipbooks. Additionally, an interactive educational video was produced using the Animaker software and integrated into the website's content. Along these software applications we acquainted with the Graphical User Interface, which refers to multimedia aspects (graphics, animation, text, audio, video) and the website dimension throughout the design process.[26,27]

Dimension of Website

To integrate all the information creation and ensure a good presentation of the website, the structure, navigation and information content played a role. These three elements distinguish one website from another.

Structure

Structure refers to the arrangement of a website's content, the number of pages, page length, layout, and content features of the main page and homepage for each target user. The homepage is the first impression that entices users to seek further information. Thus, multimedia elements with vivid graphics and eye-catching styles were used to create an attractive and consistent visual appearance on the main page and each user's webpage. In addition, when the user first logs in, they are given a unique password and username to facilitate access to the website. This element is considered part of the profile and authentication page. The website has also been designed to adapt to any display screen and users can easily access it on their preferred device.

Navigation and Links

The best practices recommend minimal scrolling as users prefer a faster way to their desired

information. Therefore, a graphical icon click function for menu-like navigation was used to take the user from one chapter or text to another and navigate the website freely. The website has a visible navigation menu at the same place on the main page, and the navigation icons for each topic are positioned on the navigation menu. However, creating the web navigation component was not an easy feat as it involved multiple screens and the pages were linked in a complex manner.[25] To limit the use of the Windows browser and search function, flipbooks, infographics, and videos were attached to simplify the text. Embedded links for quizzes and games were also used. All attachments could be downloaded and saved as PDFs for use offline.

Information Content

Information content relates to what information is included, how much information is included, and how information is presented. The content was created during stage one of content development based on preferred topics, taking into account the needs of target users, as shown in Table I. Overall, appropriate display fonts, brightness settings, audio support along with catchy titles and simple wording were used.

Stage 3: Development of the Website

The next step involved the development of the website. WordPress was used to develop the content design for each target user in the form of a website prototype. WordPress is a PHP-based open-source content management system that uses a MySQL with a template system and plug-in architecture.[28] Other interactive software mentioned in the design stage, were used in conjunction with WordPress to create more interactive content in the form of flipbooks, posters, and infographics for inclusion in the website. Thus, the overall design and development of the website provides multimedia facilities with a combination of text, images, and videos, as well as references in the form of posters and interactive flipbooks. Accessibility, ease of use, performance, and effectiveness was also integrated as part of the development process.[26, 27] All design processes were carried out in collaboration with a group of web designers, and researchers. The website dimensions are shown in Figures 2 and 3, together with the overall dimensions and characteristics of the website prototype in Table II.

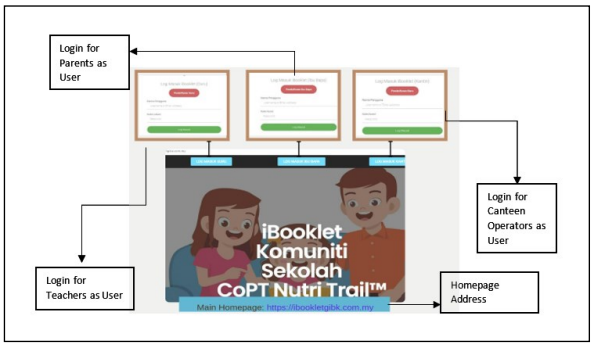

Figure 2: The Design and Architecture of the Main Homepage: CoPT Nutri Trail Website

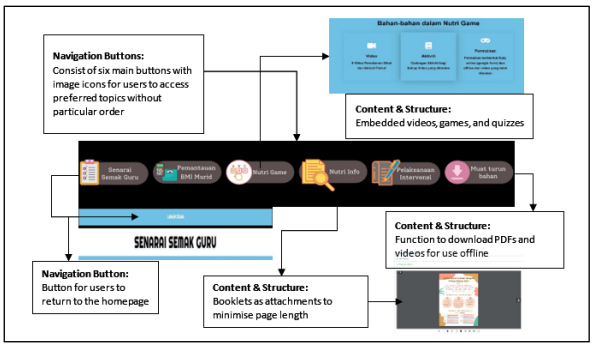

Figure 3: Example of the Webpage for Teachers as Users: Structure, Navigation, and Content Design

Stage 4: Usability Testing

The usability testing was the last step in the designing the website. It refers to the ability of a product to be used effectively, efficiently, and satisfactorily in a particular environment,[29] and to determine the quality of learning resources. Usability is a repetitive process of evaluating a website to achieve good outcomes and usually requires experts, e.g., software developers and other professionals, to test the interface against accepted usability principles before addressing the end user.[30] Therefore, IT and software development experts, nutritionists, and teachers, were invited to conduct the usability of the

Table II: Summary of Dimensions and Characteristics of the CoPT Nutri Trail Website Prototype

Structure			
Main Homepage	Website login for all domains: https://ibookletgibk.com.my		
User login	**Teachers**	**Parents**	**School Canteen Operators**
Specific username and password created	√	√	√
Visual	Graphics and real pictures	Graphics and real pictures	Graphics and real pictures
Text (type of font used)	Serif type	Serif type	Serif type
Navigation and Links			
Button design (icon/ symbol)	√	√	√
Back button	√	√	√
Interaction style: Attachment of infographics/booklets/ interactive games	√	√	√
Videos	√	√	NA
Browsing and searching (Scroll down)	For every topic	For every topic	For every topic
Left and right automation	User Introduction Main Page	User Introduction Main Page	User Introduction Main Page
Downloads	Videos and booklets	Videos and booklets	Booklets
Accessibility and home screen display compatibility with many devices (laptop/phone/desktop)	√	√	√
Information and Content:			
Topics and length of webpages	6 main topics with 24 pages	8 main topics with 47 pages	7 main topics with 24 pages
Total number of videos	9 learning videos	1 video	NA
Total number of interactive games/ knowledge checks	23 activities	12 activities	5 activities
Total number of booklets/flipbooks attached	6 booklets	4 booklets	4 booklets

website. Usability tests involving experts are referred to as alpha tests, while those involving users are known as beta tests.[31] Several researchers previously conducted usability evaluations to ascertain the efficiency and effectiveness of systems typically involving experts in these evaluations. Meanwhile, other researchers conducted studies to gauge user satisfaction towards newly developed products.[32] In addition to expert evaluation, this website also underwent beta testing with end users to assess its satisfactions among teachers, parents, and school canteen operators. However, the results of the user testing were not reported in this study.

The Usability Process

Usability testing was conducted via zoom platform, which included a focus group discussion with an assessment checklist for final evaluation. Thirteen experts were invited to participate in the session. All experts received the link to the website, including the digital user identification (ID) and password, and the assessment form for review three days prior to the discussion. The discussion session lasted about five hours and was recorded to avoid any missing important points raised during the discussion. The assessment form was divided into two sections, (i) assessment of the usability of the website interface using alpha scores, and (ii) an assessment of content validity to determine whether the content developed has met the website's objectives.

The alpha score of the website interface was assessed using three domains, namely structure, navigation and links, and information content, with a set of questions derived from the usability guidelines.[26] A Likert scale of 1 to 10 was used for these questions, with 1 indicating strong disagreement and 10 indicating strong agreement. To assess content validity, the Content Validity Index (CVI) was calculated to determine whether the four criteria for content development were met. The four evaluation criteria include relevancy, clarity, simplicity, and ambiguity. A four-point rating was used for the evaluation. The procedures for calculating the CVI were referenced from a previous study.[33] At the end of the discussion, all experts provide the scores of their assessment on the usability of the website interface (alpha score). Only eight experts from the fields of nutrition and education were subsequently need to rate the scores of their assessment of the second component, i.e., content validity (CVI) of webpage content.

RESULTS

Table III shows the usability of alpha scores given by experts during the validation process. There was little need for changes to the homepage of the website, as most experts agreed with the overall design, which effectively communicated the website's objectives to target users. The overall results of the usability test showed that the website fell into the "well-worth" category, with alpha scores ranging from 68.2% to 86.6% for various aspects including structure, multimedia presentation, colour, font, layout, audio, and video on each target user's webpage. Alpha scores above 61% indicate that the website's usability is worthy.[34]

Table III: Evaluation of the alpha score of the Website Interface (N=13)

Evaluation Criteria	Main Page (%)	Teacher's Webpage (%)	Parent's Webpage (%)	School Canteen Operator's Webpage (%)
Structure (Layout and Multimedia Elements)				
Suitable font type	72.9	68.6	72.9	72.9
Suitable font size	70.7	68.6	68.6	72.1
Simple language	79.3	67.6	70.7	75.0
Suitable graphic/ image/icon	71.4	69.3	72.1	72.9
Suitable colour design	81.4	62.9	66.4	67.1
Well-organised layout	80.7	66.4	68.6	75.7
Audio/video element	NA	70.7	71.4	NA
Presentation of interactive multimedia	85.7	71.4	77.1	75.0
Total score	**77.4**	**68.2**	**80.0**	**72.9**
Navigation and Links (Ease of Use, Functionality, and Accessibility)				
Compatible with all devices (laptop/PC/ smartphone)	85.7	80.7	83.6	85.7
User login button (easy to use): ID and password	87.1	82.1	87.1	87.1
Navigation button (clear and easy to use)	87.1	82.1	81.4	85.7
Website links function properly.	NA	82.9	82.1	85.7
QR code functions properly	NA	81.4	81.4	86.4
BMI Calculator functions properly	NA	85.7	84.3	86.4
Total score	**86.6**	**82.5**	**83.3**	**86.2**
Information and Content (Usefulness and Accessibility)				
Clear information	83.6	82.9	80.7	82.9
Easy to understand	85.7	75.7	77.1	79.3
Easy access	85.7	82.9	80.7	85.7
Relevant information for target users	NA	80.0	83.6	81.4
May improve the knowledge of target users	NA	87.9	85.7	86.4
May improve the skills of target users	NA	82.9	83.6	80.7
May improve the positive attitudes of target users	NA	81.4	82.1	74.3
Total score	**85.0**	**82.0**	**81.2**	**81.5**

NA: Not Applicable

The comments on the improvement of functionality by the experts are described below:

Main page:

The expert highlighted the significance of the main display's functionality. *"When incorporating three different user combinations within a single web host domain for the main page website address (refer to Figure II), it can cause user confusion regarding the usage of the login button. Therefore, it may be advisable to consider utilizing a distinct web hosting platform tailored specifically to the target users, thereby enhancing user experience and usability".*

Webpage for teachers as users:

"The font is too small in combination with the white layout, making backgrounds difficult to read. It is also too wordy," Use bullets or points to present the facts."

"The video part of Nutri Game was interesting. It is good to use videos and animations to teach students. improve the audio accompaniment."

Webpage for every target user:

"It is good to design icons using graphics or symbols for each navigation button to replace the name of each section or sub-topic so that users can search for information in a more attractive way instead of putting it as text, such as topic A, B, and so on. This is too academic and boring. This should apply to all sections and webpages and users can go to any section they want in a non-sequential manner."

Creating educational materials relies on the usefulness of the content. It's crucial to customize all content for the intended user to enhance their skills and knowledge. The usability score for the webpage content for each target user was more than 80.0%. The webpage content for teachers achieved 82.0%, followed by the webpage content for canteen operators and parents at 81.5% and 81.2%, respectively. All experts agreed that the content displayed on each user's webpage fulfilled the objective of improving their knowledge and skills to promote healthy lifestyles and prevent obesity in school children. However, the use of scientific terms needs to be carefully reviewed, especially on the webpage for parents. For example:

The use of the term's 'snack' and 'sedentary'. People might think that snack refers to unhealthy food. A clear and simple definition of healthy snack and unhealthy snack is needed and the term 'sedentary' can be substituted with inactivity. And another term to consider is the term 'obesogenic.' Here, a detailed explanation could be helpful so that the user understands more."

The webpage content designed also garnered unanimous agreement from all experts, as evidenced by the Scale-Level Content Validity Index (S-CVI/UA) scores ranging from 0.83 to 1.00 in terms of relevancy, clarity, simplicity,

and ambiguity. No significant alterations were deemed necessary for the content aspects, except for a thorough review to rectify any spelling errors and address interface issues. (See Table IV).

DISCUSSION

The goal of the CoPT Nutri Trail web application was to empower school communities, to enhance their skills and knowledge, fostering behavioural changes in the lifestyles of school children. The application also aimed to assist teachers in accessing information, enabling them to teach students using existing teaching materials rather than developing new ones. For busy parents with tight schedules, easy access to information, without direct participation in school activities, was a key feature. Continuous knowledge support for school canteen operators was seen as crucial to creating a healthy environment in school canteens.

Interventions in schools, which involve collaboration with communities during face-to-face sessions, emphasize the critical importance of cooperation and involvement. For instance, the lack of parental engagement can significantly diminish the effectiveness of the intervention, regardless of the dedication of teachers and the quality of the school environment. [35,36] Therefore, user engagement plays a crucial role. The CoPT Nutri Trail web application facilitates the transfer of knowledge in a more practical manner, addressing obstacles associated with traditional, in -person interventions. Moreover, by leveraging online applications, activities can be easily shared with parents without requiring them to physically attend school. This flexibility empowers school communities to integrate healthy lifestyle practices into their children's daily routines, thereby directly increasing involvement in intervention activities, which is essential for successful obesity intervention.[24]

A review indicated that web-based applications with nutrition and physical activity components could potentially decrease adolescent obesity. However, current data are insufficient to evaluate their impact on weight-related outcomes due to limited usage[37]. For example, a systematic study investigating the use of website applications among children included only 11 experimental studies, focusing solely on web-based interventions used by children and parents without engaging other school communities. Henceforward, the development of the CoPT Nutri Trail website represents a holistic approach that can be leveraged for obesity intervention in schools, further enhancing the efficacy of such weight-related interventions.

However, website design and development are crucial because they are the first steps that determine the success of any online program. The website design should be clear and self-explanatory[38] as users' question marks should be

Table IV: The Evaluation of Content Validity for Each Target User's Webpage (N = 8) (Content Validation of CoPT Nutri TraiL Webpage Content for Target Users is Based on Four Evaluation Criteria)

I-CVI of Webpage Content for Teachers as Users				
Content Development	**Relevancy**	**Clarity**	**Simplicity**	**Ambiguity**
Introduction	1.00	1.00	1.00	1.00
A: Teacher's Checklist	1.00	1.00	1.00	1.00
B: BMI Monitoring	1.00	0.88	1.00	1.00
C: Nutri Game	1.00	1.00	1.00	1.00
D: Nutri Info	0.88	1.00	1.00	0.88
E: Download Materials	1.00	1.00	1.00	1.00
I-CVI /Ave	0.98	0.98	1.00	0.98
S-CVI/UA	0.83	0.83	1.00	0.83
I-CVI of Webpage Content for Parents as Users				
Content Development	**Relevancy**	**Clarity**	**Simplicity**	**Ambiguity**
Introduction	1.00	1.00	1.00	1.00
A: Obesity	1.00	1.00	1.00	1.00
B: Get to Know Your Child's BMI	1.00	1.00	1.00	1.00
C: Kids Healthy Plate	1.00	0.75	1.00	0.75
D: Calorie Alert	0.88	1.00	1.00	1.00
E: Quick Recipes	1.00	1.00	1.00	1.00
F: Physical Activity	1.00	1.00	1.00	1.00
G: Knowledge Check	1.00	1.00	1.00	1.00
E: Download Materials	1.00	1.00	1.00	1.00
S-CVI/Ave	0.99	0.97	1.00	0.97
S-CVI/UA	0.89	0.89	1.00	0.89
I-CVI of Webpage Content for School Canteen Operators as Users				
Content Development	**Relevancy**	**Clarity**	**Simplicity**	**Ambiguity**
Introduction	1.00	1.00	1.00	1.00
A: 7 Steps to Keep the School Canteen Healthy	1.00	1.00	1.00	0.88
B: Yes and No	1.00	1.00	1.00	1.00
C: Nutri Info	1.00	1.00	1.00	1.00
D: Ideas	1.00	1.00	1.00	1.00
E: Food Hygiene and Safety	1.00	1.00	1.00	1.00
F: Knowledge Check	1.00	1.00	1.00	1.00
G: Download Materials	1.00	1.00	1.00	1.00
S-CVI/Ave	1.00	1.00	1.00	0.98
S-CVI/UA	1.00	1.00	1.00	0.88

* For elements with CVI below 0.78, content modification is performed based on expert suggestion[33]

eradicated to assist conscious decision-making and the weighing of pros, cons, and alternatives. If the navigation and architecture of the website are not intuitive, the number of question marks grows and it becomes harder for users to understand how the website works and how to get from point A to point B.

A clear structure, moderate visual cues, and easily recognisable links can help users find their way to their searching. The features of website design include the appearance of the structure, navigation, links, usefulness of information, and accessibility. These features have been appropriately integrated to increase the effectiveness of the website without burdening users in their search. Another aspect to consider is that users don't read, they scan, and the majority of users read visual content. This was the reason why more infographics were created and the navigation buttons in the website were in graphical format to attract users. The design and development of the website, therefore, involved a lot of effort and rigour in the four phases of systematic process design and had high usability ratings from experts, albeit minor corrections.

The expert evaluation remains the basis for usability testing, as they test not only the appearance and functioning of the website, but the overall performance of the website, including the relevance and suitability of the content presented. Conducting the first phase of expert usability assessment allowed changes to be made to any issues and was predictive of minor corrections required after end user testing. However, regardless of the type of usability method used in conjunction with comprehensive and rigorous design process to develop a successful website, these measures depend not only on the technical characteristics of the internet, prior planning, interactive software, and systems, but also on the end users and their characteristics, such as demographics (e.g., gender, age culture, and language), education level, experience, computer skills, and occupation.[39]
Based on a combination of these characteristics, the end users develop a unique set of needs and expectations to use the web application and this directly contributes to the success of the web-based intervention. After elements of the website were modified based on expert evaluation, the acceptance, readiness and satisfactions of users to use the web-based application were conducted.

CONCLUSION

The CoPT Nutri Trail web app was developed through a rigorous process, making it a potential guide for other researchers in developing educational websites. However, creating an educational website requires careful consideration of effort, skill, and cost. Before starting the design process, it's crucial to plan, considering these factors. Experts suggested creating separate web hosts customized for specific users to improve the user experience. However, establishing a separate host website comes with high costs and requires complex maintenance. Furthermore, if this website has its distinct web address, it fails to integrate the school community into a holistic approach to promote healthy lifestyle practices.

Additionally, incorporating new technologies and software during design and development can enhance the website's interactivity. In the realm of obesity management, especially in school settings, there are knowledge gaps regarding technology use. Barriers like information technology, available devices, internet connectivity, and costs hinder widespread adoption. Future research should assess user-level outcomes, cost-effectiveness, and user engagement to determine the feasibility of ongoing and expanded technology use in obesity management.

Hence, the CoPT Nutri Trail web application will also expand to assess how effectively the website works in obesity interventions through various measuring parameters that influence weight-related outcomes, such as changes in obesity-related behaviours like increased consumption of vegetables and fruits, decreased intake of unhealthy foods, and reduced consumption of sugary drinks among children.

CONFLICT OF INTEREST

The authors declare no conflicts of interest in this work.

INSTITUTIONAL REVIEW BOARD (ETHIC COMMITTEE)

This study has been granted an ethical approval from the Universiti Kebangsaan Malaysia's ethics committee (UKM PPI/111/8/JEP-2020-541), approval from the Department of Ethics and Medical Research, Ministry of Health Malaysia (NMRR-16-2911- 32109(IIR)) and the Education Department of the Federal Territory of Kuala Lumpur. The individual informed consent forms consisted of the information sheet and the consent form were collected from the participants before the study.

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