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'Eat Right, Future Bright: Nutrition Education Program' (ERFB-NEP) module for aboriginal primary school children in Malaysia

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Abstract:

BACKGROUND: Nutrition is essential for schoolchildren to reach their full potential psychologically and cognitively. Malnutrition, which is prevalent among aboriginal schoolchildren in Malaysia, can interfere their learning and academic performance. Developing a module to be used during a school-based nutritional intervention program is essential to ensuring that students develop healthy eating habits and lifestyles. Thus, this study aims to develop and validate nutrition education module focusing on aboriginal schoolchildren for the eat right future bright (ERFB) nutrition education program.

MATERIALS AND METHODS: This cross-sectional study was conducted in three steps: Step 1: development of module based on literature reviews, Step 2: content and face validation of the module by the expert panels, and Step 3: face validation of the module by target users. This study has used the validation form proposed by de Castro. This form consists of seven aspects, two aspects related to content validity and another four aspects related to face validity. A content validity index (CVI) was used to analyze the content validity. Two formulas were used to calculate CVI, which were I-CVI and S-CVI. Meanwhile, the data for module's face used the level of agreement.

RESULTS: Both I-CVI and S-CVI obtained more than 0.78 and 0.80, respectively, which indicate that the module has good content validity. Moreover, for face validity, the total of agreement from expert panels and target users was more than 75%, which is considered face validated.

CONCLUSIONS: In conclusion, the module that has been developed has good content validity and can be used by teachers in teaching appropriate nutrition knowledge to aboriginal primary schoolchildren.

Keywords:

Children, health education, health promotion, malnutrition, program development

Introduction

According to the World Health Organization (WHO) estimates, malnutrition among children concerning stunting, wasting, and underweight were 144 million, 47 million, and 170 million, respectively, in this worldwide population.^[1] This statistic is further strengthened by a study conducted in Malaysia; it was reported that the prevalence of underweight, stunting, and wasting among schoolchildren in rural Malaysia were 28.3%, 23.8%, and 21.0%,

respectively.^[2] These data indicate that the prevalence of malnutrition especially among aboriginal children in Malaysia is still high.

Malnutrition that commonly occurs among aboriginal schoolchildren can disrupt their learning process and school achievement. Nutrition plays an essential role in ensuring complete potential psychological and cognitive growths among schoolchildren.^[3] If malnutrition concerning underweight, stunting, and wasting is still growing,

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especially among aboriginal children in Malaysia, it may increase the risks of impaired physical and cognitive performance and morbidity and mortality during childhood.^[4]

School is a great setting for health education, and children should have the necessary knowledge, skills, attitudes, and values to promote their own health.^[5] Therefore, nutrition education should be taught to the students during school-based intervention program to promote healthy eating habits and be physically active to improve the nutritional status and quality of life of schoolchildren in rural Malaysia.^[6] According to Teo *et al.*^[4], it is crucial to understand the importance of prevention and health promotion to reduce the prevalence of the disease to achieve sustainable development goals.

The need for an effective nutrition education module also becomes urgent during school-based intervention program because there is a relationship between knowledge, attitude, and practices.^[7] By incorporating nutrition topics through an interactive nutrition education program, the children can develop a healthy lifestyle and good nutritional status.^[4]

Moreover, children who have a solid understanding of nutrition are more likely to adopt healthy eating practises. In order to help children, understand the value of having a balanced diet, it is crucial to teach them about nutrition. A viable approach to enhancing dietary practises is nutrition education. Malnutrition in emerging countries such as India is mostly caused by an ignorance of dietary requirements and the nutritional value of different food groups, as has been documented in previous studies.^[8]

In Malaysia, however, there is a lack of nutrition education module specifically targeting Aboriginal children. The existing education modules that were taught in the standard Health Education and Physical curriculum is mostly focusing on general nutritional recommendations. Thus, there is a need for an interactive and play-based education module that comprehends common nutritional problems among Aboriginal schoolchildren to overcome issues of malnutrition, stunting and wasting among them. The present study aimed to develop and validate a nutrition education module 'Eat Right Future Bright; Nutrition Education Program' for Aboriginal schoolchildren in Malaysia. This module shall serve as the main education material during the implementation of this program.

Materials and Methods

Study design and setting

This study uses a cross-sectional study. There were three steps in conducting this study, Step 1: development of

module based on literature reviews, Step 2: content and face validation of the module by the expert panels, and Step 3: face validation of the module by target users. The validation process between the expert panels and the target users was carried out through online via Google Forms.

Study participants and sampling

The researcher has selected expert panels such as dietitians and UiTM lecturers to validate the module's content and the module's face.^[9] According to Zamanzadeh *et al.*^[10] (2015), they proposed to have at least five people to give sufficient control over the chance agreement. Therefore, five expert panels consisting of two dietitians and three dietetics lecturers from UiTM Puncak Alam, Selangor, were selected to be the panel in reviewing and validating the content and face of the module. Also, the experts are chosen based on different types of expertise to give diverse ideas from their different specializations.^[9] Besides, for face validity, some research showed that they only use 10–30 samples of the target users to validate the module's face. Hence, for this study, the researcher has selected 11 teachers from Sekolah Kebangsaan Sungai Binjai, Klang, Selangor, and 9 lecturers from Institut Pendidikan Guru (IPG) Kampus Ilmu Khas, Bandar Tun Razak, Kuala Lumpur, to validate the module.

Data collection tool and technique

This study has used the validation form adapted from an instrument proposed by de Castro *et al.*^[11] This form consists of seven aspects, two aspects (scientific accuracy and content) related to content validity and another five aspects (literary presentation, illustrations, sufficiently specific and understandable material, legibility and printing characteristics, and quality information) related to face validity. All of the questions in the validation form are close-ended questions.

There were three sections on the validation form for expert panels that assessed socio-demographics (Section A), the content of the module (Section B), and the face of the module (Section C). Meanwhile, there were two sections on the validation form for the target users to answer, which consisted of socio-demographic (Section A) and validation of the module's face (Section B) only.

All of the sections in the validation form have used closed-ended questions. For example, face validation questions have used dichotomous questions that require the expert panels and target users to answer "yes" or "no." Meanwhile, content validation questions have applied rating questions. The expert panels were asked to critically review the items in the validation form and the module before providing the scoring rate for each item. The scoring rate that will be used is 1 (the item is not relevant), 2 (the item is somewhat relevant), 3 (the item is quite relevant), and 4 (the item is highly relevant).^[10]

Figure 1 depicts the diagram of this study. Prior to collecting the data, a panel of experts and target users such as dietitians, UiTM lecturers, teachers, and IPG lecturers were approached first to obtain consent from them to be part of the study. UiTM lecturers and dietitians as well as teachers from SK Sungai Binjai were approached via WhatsApp, while IPG lecturers were approached via e-mail. E-mails of IPG lecturers were obtained through the official portal of IPG Kampus Ilmu Khas. A Google Form link has been provided to all expert panels and target users through the platform mentioned before, for them to answer the questionnaire. In the Google Form link, there was a Google Drive link that allows all respondents to click and view the modules they need to value. After viewing the module, the respondents must fill in the Google Form to validate the content and face of the module. At the end of the questionnaire, respondents were asked to leave responses and suggestions for improvement for this module.

Ethical consideration

Ethical approval was obtained from the Research Ethics Committee of Universiti Teknologi Mara (UiTM) with reference number REC/07/2021 (MR/589). The respondents of this study participated voluntarily, and data were collected anonymously. Authors have obtained consents from all respondents prior to the study recruitment.

Data analysis

Content validity is important to ensure the overall validity and whether the module's content is relevant.^[12] The data for the module's content was calculated by using the content validity index (CVI). There are two formulas that have been followed to conduct the CVI, which are I-CVI (item-level content validity index) and S-CVI (scale-level content validity index). In this study, there were five expert panels that have validated the content of the module. Therefore, according to Polit, Beck, and Owen (2007), a study that comprises three to five experts needs to get at least 0.78 or above for I-CVI and 0.80 or above for S-CVI to indicate good content validity.^[13]

Meanwhile, the module's face validity data used the level of agreement based on five evaluation aspects of the instrument: literacy presentation, illustrations, sufficiently specific and comprehensive material, legibility, and printing characteristics and quality of information. These items need to have at least 75% of positive responses to indicate adequate face validity for the module.^[9]

Results

Step 1: Module development

This module is named "eat right, future bright." It was created using Canva, a graphic design platform that

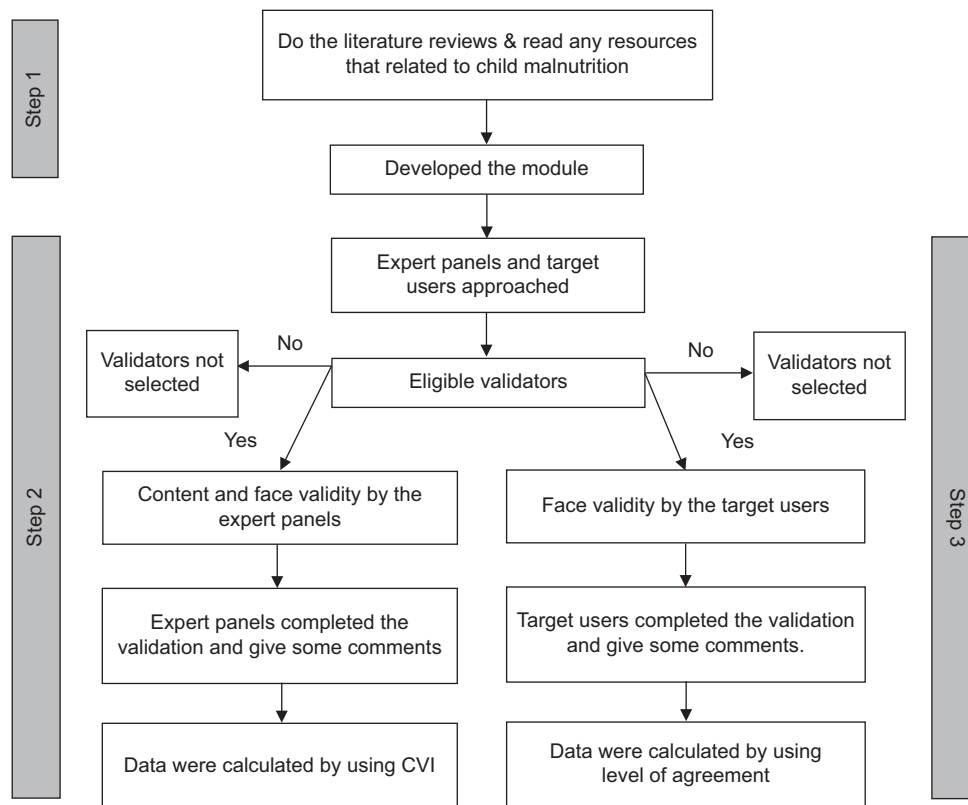


Figure 1: Study diagram for development and validation of ERFB module

allows everyone to create anything. This module has 147 pages, and it is written in Malay language to make it easier for teachers to understand and convey knowledge to students. There are three logos on the front of the module, which are the Nutrition and Dietetics Student's Association (NADA) logo, the Universiti Teknologi Mara (UiTM) logo, and the IPG logo.

An introduction, module objectives, lesson plan structure, and table of content for topics on nutrition, physical activity, and personal hygiene are all included in this module. This module has provided a complete lesson plan structure to the teachers by dividing each topic into four parts which are a topic introduction, learning plan, activity flow, and quiz. Topic introductions are offered for each topic to provide teachers with basic information about the topics to ensure they have the knowledge and understanding they need to teach the students. The learning plan outlines the topic's objectives and the teacher's preparation before class and the teaching materials required for the class activity.

The flow of activities gives the teacher an idea of how this class will be conducted in 60 min. There will be activities such as quizzes and games related to the topics taught throughout the class. The teacher must conduct a pre- and post-quiz with the students on the topic they are learning every time the class begins and finishes. This quiz is designed to provide the teacher with an overview of the students' knowledge both before and after the lesson. After completing the pre-quiz, the teacher will begin class by conducting activities based on the lesson plan that has been developed. Teachers will teach while playing in order to keep students attentive in the classroom.

This module contains eight topics, including six nutrition-related topics, one physical activity-related topic, and one hygiene-related topic. Each topic is taught in the form of activities to make the learning sessions more enjoyable. Activity materials and how the activities are implemented are also provided at the end of each topic. This learning method can help students gain more understanding and help them remember the essential things in each topic. The topics, learning outcomes, activities, and learning time of the module are summarized in Table 1.

Step 2: Content and face validation by expert panel

The module was reviewed by an expert team composed of three lecturers from the dietetics department, UiTM Puncak Alam, and two dietitians from Diet Care Center, UiTM Puncak Alam, to enhance the exchange of ideas. The expert panels were purposefully chosen to generate a wide range of ideas based on their various specialties.^[9] These experts were consulted via an online survey to

see whether the module's information is appropriate for primary school students. It is also crucial to ensure that all of the necessary content is included and that any unnecessary content is removed.^[14]

The data for the module's content were calculated by using the CVI. I-CVI and S-CVI are the two formulas that have been used to calculate CVI. The I-CVI indicates expert agreement for each item, whereas the S-CVI is used to determine expert agreement for overall items.^[10] The module content is considered validated when the agreement among the expert panels based on I-CVI is more than 0.78 while S-CVI is more than 0.80.^[15]

For the module's content, "Scientific Accuracy" received an I-CVI of 1 for each item while "Content" had an I-CVI of one for three out of four items where that one item only gets 0.85. This happened because one of the five experts does not agree with one of the evaluated items in these criteria, which is the important point reviewed. However, the I-CVI result shows more than the minimum value of 0.78, indicating a good content validity.^[15] Moreover, when calculated the CVI by using S-CVI formula, the result demonstrated a strong agreement between the experts on content validity [Table 2]. This module is declared content validated because its S-CVI is 0.97.

In conclusion, all of the CVI values met the minimum recommendation. The experts agreed that the module satisfies the "module's" standards and can be used by teachers to teach students about health nutrition, physical activities, and personal hygiene practices.

Four evaluation criteria of the instrument, which are literacy presentation, illustration, legibility, and printing characteristic and quality of information, were calculated by using the level of agreement to determine the face validity of the module. Figure 2 shows that experts' level of agreement was high, ranging from 95% to 100%, which was higher than the specified minimum of 75%.^[16] This means that the module has sufficient face validity. The content and activities in this module were rated highly by all expert panels. They also offered suggestions for improving this module, such as expanding the text and ensuring that the images used in this module are free from copyright concerns.

Step 3: Face validation by target users

The face validation was also reviewed by the target user consisting of nine lecturers from IPG Kampus Ilmu Khas and 11 teachers from SK Sungai Binjai. The target users need to evaluate the face of the module based on four criteria which are literacy presentation, illustration, legibility and printing characteristic and quality of information. The data were analyzed by using the level of

Table 1: Topics, learning outcomes, activities of the "eat right, future bright" module

Unit	Topics	Learning outcomes	Activities	Learning time
1	Prinsip Asas Pemakanan Sihat	At the end of this session, students will be able to find out: The importance of a healthy diet Healthy eating practices include the Malaysian Food Pyramid and Malaysian Healthy Plates	Let's build a food pyramid My favorite food	60 min
2	Makan Sayur-sayuran dan Buah-buahan Setiap Hari	At the end of this session, students will be able to find out: Definition of vitamins, minerals, and examples The benefits of consuming vegetables and fruits Tips for liking vegetables and fruits Consumption of vegetables and fruits by color The recommended intake of vegetables and fruits Methods for consuming vegetables and fruits a day	Rainbow on food Let's make a healthy sandwich	60 min
3	Makan Bijirin atau Ubi-ubian Secukupnya	At the end of this session, students will be able to find out: Definition of carbohydrates and examples Cereals as the main source of energy The importance of consuming whole grains How to identify whole grain products in the market The recommended intake of cereals or tubers. Methods for consuming whole grains daily.	Let's get to know cereals and tubers Let's color the food Food puzzle	60 min
4	Makan Daging, Ayam, Telur, Ikan dan Kekacang Secara Sederhana	At the end of this session, students will be able to find out: Protein definitions and examples Benefits of protein intake Signs of a person being deficient in protein Protein from animals VS protein from plants The recommended intake of meat, poultry, eggs, fish, and legumes	Introduction of protein Music card game Pizza collage	60 min
5	Minum Susu dan Produk Tenusu Setiap Hari	At the end of this session, students will be able to find out: Benefits of consuming milk Suitable and unsuitable milk for children to drink Alternatives are other than milk The recommended intake of milk and dairy products Creative methods to drink more milk	Goodness in a glass Let's paint Milk box origami	60 min
6	Hadkan Pengambilan Makanan Tinggi Lemak, Gula dan Garam	At the end of this session, students will be able to find out: Introduction to fats, sugars, and salts Effects of excessive fat, sugar, and salt intake Identify hidden fats, sugars, and salts Tips to reduce fat, sugar, and salt in food. Healthy exchange to reduce fat, sugar, and salt. The recommended intake of fat, sugar, and salt.	What is fat, sugar, and salt? Get to know foods that are high in fat, sugar, and salt Swap that food	60 min
7	Kekal Aktif Setiap Hari	At the end of this session, students will be able to find out: Definition of physical activity Benefits of physical activity for children Pyramid of physical activity	Chalk circuit	60 min
8	Amalan Menjaga Kebersihan Diri	At the end of this session, students will be able to find out: The importance of maintaining personal hygiene The effect of not maintaining personal hygiene Things that must be done to maintain personal hygiene	Wash the germs Let's dance Bright and shine Cut fingernails and toenails	120 min

agreement where all the criteria must achieve more than 75% of the agreement to be considered as face validated. Figure 3 shows that all four face validity criteria had a level of agreement higher than the needed minimum to be valid, which is 75%, indicating an excellent level of agreement among target users. In summary, these data showed that the module had achieved face validity for the target user.

Discussion

Malnutrition among aboriginal children, particularly primary school students, is significant. No study in Malaysia has ever developed nutrition education modules, specifically for aboriginal primary school children to help address this issue. As a result, this present study has developed a nutrition educational

Table 2: Content validity index for “eat right, future bright” module by expert panels (n=5)

Criteria	Item description	Relevant (3 or 4)	Not relevant (1 or 2)	I-CVI ^a	Interpretation ^b
Scientific accuracy	Contents are in agreement with the current knowledge	5	0	1	Relevant
	Recommendations are necessary and are correctly approached	5	0	1	Relevant
Content	Objectives are evident	5	0	1	Relevant
	Recommendation about the desired behavior is satisfactory	5	0	1	Relevant
	There is no unnecessary information	5	0	1	Relevant
	Important points are reviewed	4	1	0.8	Relevant
S-CVI/Ave ^c				0.97	Excellent

^aI-CVI (Item-level Content Validity Index): number of expert panels who are agreed with the items by rating them as relevant (rating 3 or 4) divided by the total number of expert panel (n=5); ^bI-CVI is higher than 0.78; therefore, the items are relevant; ^cS-CVI/Ave (Scale-level Content Validity) index based on the average method): total of I-CVI scores divided with number of items. The value of S-CVI is higher than 0.80; therefore, it is indicated as excellent content validity

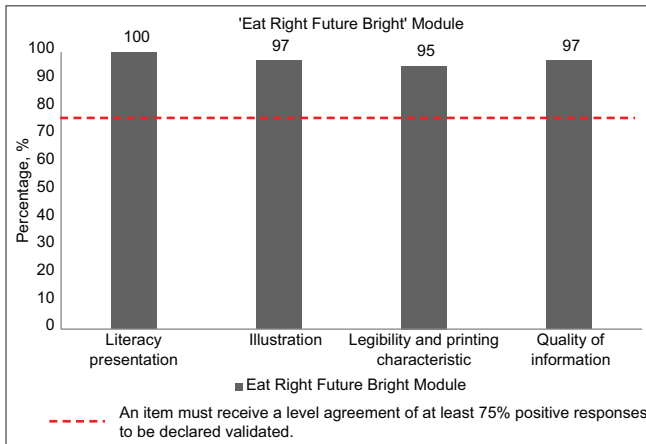


Figure 2: Level of agreement among expert panels for evaluating aspects of face validity

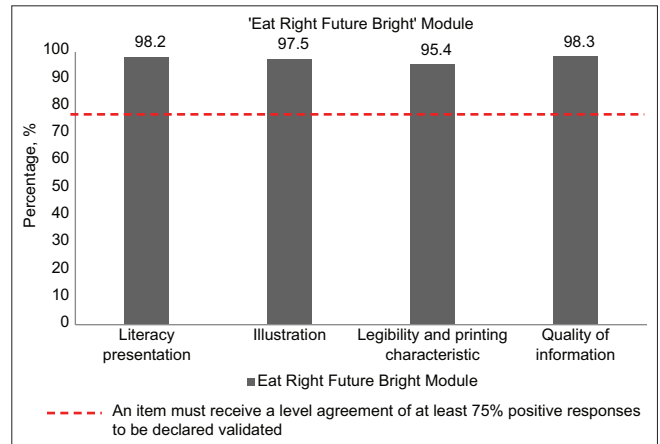


Figure 3: Level of agreement among target users for evaluating aspects of face validity

module to resolve the issue. This module was built exclusively for the ‘Eat Right, Future Bright’ nutritional intervention program. This module was created specifically to address the nutritional problems that aboriginal children face.

This module is entitled ‘Eat Right, Future Bright.’ This name was chosen because our aim is to instill healthy eating habits in them, resulting in a healthier future. The majority of the topics chosen for this module were according to the extensive literature done before. There are three main aspects covered in this nutrition educational module which are nutrition, physical activity, and hygiene. Each topic was provided with a set of supporting teaching materials, which included engagement games, flashcards, worksheets, and instruction for activities.

The module incorporates social learning theory into the classroom to create a positive learning environment that encourages students to participate in class and enjoy their learning. According to social learning theory, students can learn new behaviors through observation and imitating others. One of the possible ways to incorporate social learning in the classroom is by changing the way students would traditionally learn. Students can learn

through gamification and simulations where these might help teachers turn their classroom into a more interactive experience. This method can also assist students in comprehending and remembering what they have learned during the class.

When choosing and designing an effective educational module, it is crucial to think about the appearance more than the content. Colors and beautiful graphics can easily change one’s opinion, but one must know how to select learning materials that are understandable in all areas.^[17] Each student is a unique learner with different unique learning processes. Therefore, module developers should consider how text is presented to enhance students’ learning. A study conducted by Halamish *et al.*^[18] has proven that children would remember large font size words better than small font size words. In fact, children remembered the large font size words better.

Furthermore, colorful modules can aid learners in focusing their attention on specific information, which aids in transferring that information to short- and long-term memories, hence increasing their chances of remembering it.^[19] Moreover, infographics are used in education to present complex information clearly and concisely.^[20] Infographics are effective in educational

settings because they employ images to highlight, explain, or enhance text-based content. Despite their complexity, they have a unique ability to catch attention, transmit information, and increase data retention. In addition to being eye-catching and visually appealing, studies show that infographics can assist students better comprehending and remembering large amounts of information.^[21]

An excellent educational module also needs to implement play-based learning (PBL) activity in order to attract students to learn something new. PBL incorporates play and learning together.^[22] Through the engaging and developmentally appropriate design of academic learning experiences, PBL is child-centered and focuses on children's development, interests, and abilities.^[23] The primary goal of PBL is for students to learn while playing. PBL also provides students with more effective and more profound learning experiences than direct instruction and "free play."^[24] PBL allows students to explore, make mistakes, research, and undertake trial and error, which enriches their learning experience. Play also allows students to build on their existing knowledge, experiences, and skills through interactions with classmates and their surroundings, which can help them extend their academic learning.

One of the strengths of the present study is that the developed module was tailored to the needs of primary school children in Malaysia. The module was also validated by a panel of experts before it will be implemented in the intervention study. Therefore, it improves the effectiveness of the module as content refinement was accomplished. However, this module also has its own weakness, although it is made specifically for Aboriginal primary school students, it is still not exactly specific to them. According to literature reviews that was done before, most nutritional problems that Aboriginal children suffer are identical to those that urban children may face.

This module has highlighted important issues that should be addressed to Aboriginal students, but the menu and food recommendations given in the module are not so focused on the food they eat. In addition, each Aboriginal village has its own culture and cuisine, therefore many foods example in this module is not particularly tailored to the target for this program which is in Gerik, Perak. As a result, further research is needed to create a more specific module for Aboriginal children. Future researchers are encouraged to visit the area where the intervention programme will be carried out to see what nutritional problems the Aboriginal face, the nutrition that they practise, understand their culture, and incorporate their suggestions and ideas into the development of the module.

Conclusion

This "Eat Right, Future Bright (ERFB) module was developed specifically for use in the ERFB Nutrition Education Program specifically for Aboriginal schoolchildren. This module was content validated and can be used among primary school teachers to advocate the schoolchildren on healthy eating and physical activity in Malaysia. This module has the potential to be incorporated into existing physical education textbooks in primary schools.

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Conflict of interest

There are no conflicts of interest.

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