

DEVELOPMENT OF A SNAKES AND LADDERS GAME-BASED NUTRITION EDUCATION MEDIA TO ADDRESS ANEMIA IN ADOLESCENT FEMALES

Winda Sauci Panjaitan*, Kusnandar, Nur Hafidha Hikmayani

Human Nutrition Department, Nutrition Sciences of Postgraduate Program, Universitas Sebelas Maret, Jln. Ir. Sutami 36 A, Kentingan, Jebres, Surakarta, Central Java, 57126, Indonesia

*windasauci@student.uns.ac.id

ABSTRACT

In 2023, the global prevalence of anemia among female adolescents is projected to reach 32.8%, indicating a persistently high prevalence. The primary cause of anemia is iron deficiency, and its common signs and symptoms include weakness, fatigue, lethargy, tiredness, and a lack of energy which can significantly impact the well-being of individuals. Young women with anemia may experience growth retardation, increased susceptibility to infections, reduced physical fitness, and difficulties in concentration and learning. One strategy to address this issue is the development of a creative nutritional education media that can improve adolescents' knowledge about anemia. Therefore, this study aims to develop a Snakes and Ladders game-based nutritional education media, specifically designed for adolescent females who are at a higher risk of developing anemia. The research follows a research and development approach using the ADDIE model, consisting of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. Both qualitative and quantitative data analyses were employed to analyze the media validity. Quantitatively, the educational media received positive validation scores, with media experts providing an 84.4% rating, material experts rating it at 83.8%, and linguistic experts at 85.2%. The young female respondents in the media trial phase achieved an average knowledge scores of 88% regarding anemia. In conclusion, the nutrition education media based on the popular Snakes and Ladders game is both feasible and effective as an educational tool for anemia education. Further development of the educational media should consider targeting a broader audience, such as pregnant women and nursing mothers

Keywords: anemia; adolescent females; nutrition education media; snakes and ladders game

INTRODUCTION

Anemia is a condition in which the hemoglobin level in the body is less than normal. This is influenced by several factors, including nutritional deficiencies to bleeding due to menstruation. One of the main causes of anemia is iron deficiency (Az-zahra *et al.*, 2022) Globally, in 2023 the prevalence of anemia in young women will reach 32.8%, indicating that the prevalence is still relatively high (WHO, 2023). According to Rikesdas data from the Research and Development Agency of the Republic of Indonesia Ministry of Health in 2018, the prevalence of anemia in young women is 32%, meaning that 3-4 out of 10 young women in Indonesia suffer from anemia. Signs and symptoms of anemia, in general, include 5L (weak, tired, lethargic, tired, and limp). The effects of anemia on young women include stunted growth, infection, decreased body fitness, and impaired concentration in learning. In addition, anemia in young women can increase the risk of death during childbirth, premature birth, and low birth-weight babies (Yulita *et al.*, 2020).

Efforts to prevent and treat anemia in adolescents in Indonesia are generally carried out through three main programs, namely iron supplementation, nutrition education, and food fortification. These efforts need to be done by adjusting to fun and interesting methods for teenagers. One effort to overcome anemia is to develop creative educational media that can increase knowledge about anemia in young women (Fathony *et al.*, 2022). Educational media given to adolescents must be interesting so that the delivery of information can be well received, so providing education requires

the right learning media as an intermediary. Learning media is one of the components of the learning system that can convey messages and stimulate thoughts, feelings, thoughts, and the will of adolescents so that they can encourage intentional, purposeful, and controlled learning processes. With educational media, adolescents will be more motivated to learn, speak and imagine (Mahesti *et al.*, 2021). In line with Kurniasari's 2022 research, that games or games are the best way for children to be actively involved in thinking and learning.

Development of anemia educational media based on the Snakes and Ladders game (learning media) in the form of a square board and there are picture boxes. The guidebook contains how to play and content related to anemia. The color that distinguishes the question and statement cards is that the yellow card is a question while the blue card is a statement. dice and also pawns as player markers. Anemia educational media based on Snakes and Ladders games can later be used by teenagers to learn while playing, so that the educational process becomes fun, enthusiasm for participating in education, easy to understand the material, helps develop thinking power, becomes more creative and active so that education becomes more meaningful and can increase knowledge in young women. Educational media is used as an awareness-raising tool that can increase knowledge about the prevention and management of anemia (Mahesti *et al.*, 2021; Hidayah *et al.*, 2021). So this researcher will develop anemia education media based on Snakes and Ladders games for young women

METHOD

This development research with research design Research and Development (R&D) used the ADDIE which consists of five stages namely Analysis, Design, Development, Implementation and Evaluation. The educational media that have been developed are tested for validity qualitatively and quantitatively (Adesfiana, 2022 ;Istiningsih *et al.*, 2021). The goal of the stage analysis is to find out the development of anemia education media based on the Snakes and Ladders game. The stages of planning educational media are based on the suitability of the media developed to increase knowledge in young women. And adapted to topics, sub-topics, competencies, and indicators to achieve educational goals. The stage of developing educational media is in the form of anemia education media based on snakes and ladders games. Stage implementation is the trial phase of anemia education media based on the snakes and Ladders game which has been developed through a review process by media experts and material experts. The evaluation phase examines the feasibility of anemia education media based on Snakes and ladders games to increase knowledge about anemia in young women.

Instruments for researchers in data collection used media expert validation questionnaires, material expert validation questionnaires, and response questionnaires aimed at young women using nutritional education media based on snakes and ladders games. With the help of a questionnaire from media experts, it was determined whether the use of educational media based on snakes and ladders games was appropriate to the theme, indicators of basic competency activities and teaching materials being developed. Media experts also look at the physical quality of the media which refers to the durability and security of the media. Technical quality, namely media usability and media attractiveness. Material experts focus on the feasibility of the material or content presented in educational media, as well as the language aspects of educational media which become a bridge for responses through game media so that the objectives of the educational media can be achieved properly. After the media is declared feasible by experts, then the media is tested in the field. The

experimental activity was carried out at the Sebelas Maret University Postgraduate Program, the research data were analyzed descriptively quantitatively. The due diligence assessment for the validation sheet of media experts, material experts, linguists and young women's responses to the educational media developed was carried out using a Likert scale. The score of alternative answers given by respondents can be seen in Table 1.

Table 1.
 The score of each alternative answer

Score	Criteria
5	Very good
4	Good
3	Enough
2	Less
1	Very less

Data Analysis used to determine the feasibility of educational media based on the snakes and ladders game is the percentage of the total assessment of each by experts using a validation questionnaire sheet. The eligibility criteria for educational media based on the percentage results can be seen in Table 2.

Table 2.
 Eligibility Level Qualification Based on Percentage

Achievement rate (score)	Interpretation
81%-100%	Very Worth it
61%-80%	Worth it
41%-60%	Decent Enough
21%-40%	Less Eligible
0%-20%	Not feasible

(Source : Purnamasari, 2019)

RESULTS AND DISCUSSION



Figure 1. Ladder Snake Game Guidebook Board

The educational media for anemia based on the Snakes and Ladders game developed in addition to the board game which can be seen in Figure 1, is also accompanied by a game manual and materials used in the Snakes and ladders game. Game participants who first study the guidebooks and materials used in educational media will certainly be better prepared to answer every question on the card. Apart from that, dice and pawns are also used in the game of snakes and ladders which are typical for player markers.

Media Expert Validation Test Results

The validation test for learning media experts is in the form of an assessment questionnaire that uses a format rating Scale. The learning media expert assessment questionnaire is used to determine the validity of educational games and the extent to which educational games are appropriate for use and get comments on aspects of the assessment by the validator. The results of the assessment aspect can be seen in Table 3.

Table 3.
Results aspects of evaluation by members of the media

Assessment aspects	Average	Percentage	Category
Media efficiency	4.5	90%	Very worth it
Media accuracy	4.0	80%	Worth it
Aesthetics	4.6	92%	Very worth it
Media resistance	4.0	80%	Worth it
Safety for participants	4.0	80%	Worth it

Table 3. Shows the highest results on the aesthetic assessment aspect with a percentage of 92% and has the lowest assessment aspect with a percentage of 80%, namely media accuracy, media durability, and safety for participants. And has an average value of 4.22 (84.4%) with a very decent category.

Material Expert Validation Test Results

The validation test for learning material experts is in the form of an assessment questionnaire that uses a format rating Scale. The learning material expert assessment questionnaire is used to determine the validity of educational games and the feasibility of educational games to be used and get comments on aspects of the assessment by the validator. The results of the assessment aspect can be seen in Table 4.

Table 4.
The results of the assessment aspects by material experts

Assessment aspects	Average	Percentage	Category
Material selection accuracy	4.5	90%	Very worth it
Systematic preparation of material	4.25	85%	Very worth it
The suitability of the material with the learning objectives	4.2	84%	Very worth it
Material clarity	4.0	80%	Worth it
Ease of understanding the material	4.0	80%	Worth it

Table 4. Shows the highest results on the aspect of assessing the accuracy of selecting material with a percentage of 90% and has the lowest assessment aspect with a percentage of 80%, namely clarity of the material, and ease of understanding material. And has an average value of 4.19 (83.8%) with a very decent category.

Language Expert Validation Test Results

The validation test for linguists is in the form of an assessment questionnaire using the Rating Scale format. Assessment questionnaires by linguists are used to determine the validity of educational games and the extent to which educational games are appropriate for use and get comments on aspects of the assessment by the validator. The results of the assessment aspect can be seen in Table 5.

Table 5.
The results of the evaluation aspect of the validation test by linguists

Assessment aspects	Average	Percentage	Category
Use of language rules	4.25	85%	Very worth it
The language used is communicative	4.25	85%	Very worth it
Accuracy of language selection	4.8	96%	Very worth it
Correct spelling and terminology	4.0	80%	Worth it
Compilation of sentences (message content/information) given	4.0	80%	Worth it

Table 5. Shows the highest results on the aspect of assessing the accuracy of language selection with a percentage of 96% and has the lowest rating aspect with a percentage of 80%, namely the accuracy of spelling and terms, and sentence construction (message/information content). And has an average value of 4.26 (85.2%) with a very decent category.

Results of practicality assessment by adolescent

The results of this assessment aim to see the validation of the practicality of educational media, whether it is in accordance with the goals to be achieved. Questionnaire using Rating scale. The results of the assessment aspect can be seen in Table 6.

Table 6.
Results of practicality assessment by adolescent

Respondent	Average	Percentage	Category
Responden 1	4.07	81%	Very worth it
Responden 2	4.14	82%	Very worth it
Responden 3	4.14	82%	Very worth it
Responden 4	4.71	94%	Very worth it
Responden 5	4.42	88%	Very worth it
Responden 6	4.35	87%	Very worth it
Responden 7	4.64	92%	Very worth it
Responden 8	4.14	82%	Very worth it
Responden 9	4.57	91%	Very worth it
Responden 10	4.78	95%	Very worth it

Table 6. Shows the media quality assessment on 10 respondents with an average of 4.4 (88%) can be said to be very feasible. According to the criteria for educational media previously shown in Table 3. Percentage of 84.4% can be said to be nutritional education media based on the game of snakes and ladders, including the very appropriate category for use in learning.

Analysis stage

Conducted to explore the underlying problems encountered. Process Analysis as the initial activity of developing educational media based on snakes and ladders game. In educational media, an innovation is made that can restore motivation and interest in learning in young women related to anemia prevention. The game of snakes and ladders was chosen because in this game the respondents could not play alone and had to involve other friends with a total of 4-5 respondents. Learning through play will create a competitive environment that is supported by its characteristics. Content in education can help respondents easily understand the material presented and actively participate in games (Wati, 2021; Wulandari et al., 2022).

Design stage

In the process of designing the components involved in the game of snakes and ladders, as well as designing the appearance of the game according to the cognitive level of young women. The process of designing educational media based on the Snakes and Ladders game is done by using Canvas. Canva is a design program online that provides various facilities such as designing presentation designs, resumes, posters, pamphlets, brochures, graphics, infographics, logos, labels, bookmarks (bookmarks), and so on. Canva is used as the main tool in the process of designing the display of nutrition education media because apart from being easy to use, this application can also be used to design boxes and question cards, and statement cards. Besides that canvas also assists in designing images for educational media, arrangement of writing, and selection of fonts (font) that are diverse to make the game of snakes and ladders more attractive to respondents/users of the media (Tanjung *et al.*, 2019;Garris Pelangi, 2020).

Development stage

Development aimed at creating a blue-print that is at the design stage becomes a reality (Dewi, 2018). At the development stage, in addition to the process of printing educational media based on the Snakes and ladders game, printing the cards and various components used in the Snakes and ladders game, making three dice, each of which has the numbers 1, 2, 3, the researcher also asked the opinions of experts. both material experts and media experts before carrying out educational media were tested on small groups (Annajati *et al.*, 2023;Afifah *et al.*, 2017). Product trials before implementation aim to collect data that can be used as a basis for making improvements to achieve the level of validity and feasibility of educational media based on the snakes and Ladders game. With the results of validation by material experts with a percentage of 83.8% and educational media experts with a percentage of 84.4%, both of them are generally in the very decent category.

Implementation stage

This is a continuation of the development stage, namely the trial stage of educational media based on snakes and ladders games in small groups. All educational media designs that have been developed are then implemented after various revisions are made according to input or feedback from the experts (Afifah *et al.*, 2017). The trial phase was carried out by 10 respondents to obtain data regarding the responses of users of Snakes and ladders educational media.

Evaluation stage

This is the final stage of the development process. The evaluation stage is carried out by looking at and analyzing the responses of users after using educational media based on snakes and ladders games (Afifah *et al.*, 2017). The results of the responses of 10 users are shown in Table 6. It can be seen that the average is 4.4 (88%) which indicates that the nutrition education media based on the game of snakes and ladders is very good for use in learning to increase knowledge regarding prevention of anemia in young girls. The advantages of educational media based on snakes and ladders game after development are educational media using attractive images so that the respondents' attention becomes more directed to the educational media used. In addition, the game media is also in accordance with the characteristics of the respondents. The snake and ladder game media makes respondents more active during educational activities because all respondents have the same opportunity to play and learn (Wati, 2021). Therefore, anemia education media based on snakes and ladders game also emphasizes cooperation, competition and instills a spirit of sportsmanship in respondents.

CONCLUSION

Based on the results of the study it can be concluded that the anemia education media based on snakes and ladders game that has been developed is very suitable for use in the learning process with the percentage of assessment aspects by media experts as much as 84.4% in the very feasible category, by material experts as much as 83.8% in the very category feasible, by linguists as much as 85.2% in the very feasible category and the results of 10 respondents as much as 88% who also obtained very decent qualifications so that they could measure and increase young females knowledge about anemia. From the results of research on anemia education media based on snakes and ladders games, it is suggested to be implemented in a wider target population such as pregnant women and nursing mothers.

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