

Score Detection and Anemia Education Prospective Bridals Using Android Based Macca Botting Application

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Abstract

Anemia is the highest cause of maternal death in Indonesia. Various methods were used to assist in preventing and overcoming anemia. The method used was Research and Development with the Borg and Gall development model which was simplified by the Research Center for Policy and Education Innovation Team of the National Education Research and Development Agency (Pultijaknov) and quantitative research methods with a quasi-experimental research design. The research was conducted in January-July 2020 at religious affairs office Biringkanaya Makassar. The subject of this research was the bride and groom at the Biringkanaya Religious Affairs Office in Makassar. Data analyzed used the Mann Whitney test. The results showed that the application of score detection and anemia education for the bride and groom was assessed by material experts with an average score of 3.30 (very good), the media expert's assessment was 3.25 (good) and the assessment of the prospective bride and groom in the small sample trial got a score of 3.63 (very good). The results of the large sample trial obtained p value $0.000 < p < 0.05$ that the botting macca application has an effect on the detection of scores and anemia education of the prospective bride. The development of an Android-based Botting Macca application program can be developed and it was suitable for future used.

Keywords: android, anemia, score detection application, education.

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1. Introduction

Anemia occupies the highest percentage of causes of maternal mortality in Indonesia, which is 28% (Kemenkes RI n.d). Anemia is a condition in which hemoglobin (Hb) levels in the blood are less than normal (12g / dL) in women of childbearing age (Gómez-Ramírez et al. 2019). According to Panyang et al (2018), women of childbearing age are very susceptible to anemia, which is 55.3% at age (15-49 years) (Chowdhury and Chakraborty 2017). Anemia in women of childbearing age will affect cognitive development and behavior, energy metabolism, immunity, work capacity and conditions of pregnancy, childbirth and childbed (Mohebi et al. 2018). The main cause of anemia in women of childbearing age is a lack of intake of nutrients such as protein and vitamins (Bouri and Martin 2018), excessive coffee consumption, and less consumption of iron (Fe) tablets (Amanupunnyo, Shaluhayah, and Margawati 2018). In addition, factors of poverty and low levels of education make WUS more vulnerable to anemia (Pasricha et al. 2015).

Women of childbearing age determine the condition of pregnant women and during pregnancy. The nutritional status and health of the mother before pregnancy, during pregnancy and during breastfeeding are critical periods for child growth and development. The first 1000 days of life are a sensitive and decisive period for the nation's future generations (Prieto-Patron et al. 2018). The proportion of women of childbearing age in Indonesia who received Blood Supplement Tablets in 2018 was 76.2%. increased from 2013 to 2018, the increase was 11.8% (Ika Ratnawati, SKM 2019).

In fact, the Blood Supplement Tablet program has not been able to significantly reduce the number of anemia sufferers among women of childbearing age. The failure of this program is influenced by several factors, namely compliance in consuming Blood Supplement Tablets and improper way to consume Blood Supplement Tablets, both in terms of time and how to consume them (Dieny et al. 2019). The process of iron absorption is strongly influenced by the availability of vitamin C to help reduce ferri(Fe^{3+}) to ferro (Fe^{2+}) in the small intestine so that it is easily absorbed. (Sarah and Irianto 2018; Pradanti, M, and Sulistya 2015).

Audio visual media is considered more effective than leaflets (Putri, rezal, and Akifah 2017). Therefore, a more practical and efficient educational media is needed. The mobile smartphone application is more accessible to the public, especially women of childbearing age because it has several advantages, including speed and accuracy in making decisions and as a good data storage medium (Hidayah, Nurazizah, and Rahmawati 2019). In addition it has the ability to interpret and act on reminders and can detect differences over time (monitoring behavior change) (Litwin et al. 2018). In Indonesia the anemia application has been successfully made by Hamid et al (2020), this application has an early detection feature of anemia, but the application is still in the design stage and has not been tested in the community (Hamid et al. 2020). So that in this study, a new application called Botting Macca was developed.

The Botting Macca application was designed to detect anemia scores by asking questions to the application user. The results of these questions were used as the basis for determining the user's health level. In addition, this application has added an automatic feature in the form of an alarm for drinking Blood Supplement Tablets and can monitor changes in user behavior. So, the application was expected to provide education and prevention of anemia for women of childbearing age who will become future brides.

2. Method

2.1 Study design

This study used Research and Development (R&D) with the Borg and Gall development model and quasi-experimental pre-post test. This research method intends to develop or validate products applied in education (Short et al. 2018). The product will go through a validation test by a media expert, two material experts and a small (n = 10) and large (n = 40) sample trial (Amelia et al. 2020).

2.2 Participants

Respondents came from prospective brides who were taken by purposive sampling around January - July 2020 at religious affairs office Biringkanaya. The intervention group (n = 20) was given Botting Macca application and the control group (n = 20) was given score detection and education by using print out media.

2.3 Data collection

Respondents in each group filled in the score detection section in the form of 12 questions related to signs of anemia symptoms including (5L (lethargy, tired, weak, tired, negligent), headache, dizzy eyes, easily drowsy, quickly tired, difficult to concentrate, pale on the face, pale on the lower eyelid, pale on the lips, pale on the skin, pale on the nails, pale on the palms) and monitored for research activities once a week, for 4 weeks.

2.4 Data Analysis

Processing and data analysis in this study were obtained from research instruments in the form of qualitative and quantitative data. Quantitative data were obtained from the recapitulation of the validation questionnaire of media experts, material experts and small sample tests as well as the results of pre-test and post-test trials. Meanwhile, qualitative data were obtained from suggestions / input from media and material experts after assessing the score detection application and anemia education for the bride and groom.

In this study, the product suitability score was decided in the range 2.51-3.25 or 3.26-4.00 so, this aspect can be said to be valid and does not need to be revised of the score which can be seen in (Table 1).

Table 1. Value ranges and scales

Range	Value Scale
Very good	3.26-4.00
Well	2.51-3.25
Enough	1.76-2.50
Not good	1.00-1.75

Source: Nurhayati, 2019

2.5 Research Ethics

The study has received a recommendation of ethical approval from the Faculty of Public Health, Hasanuddin Makassar University with protocol number 7420092136.

3. Result

3.1 Macca Botting Application Products Based on Android

The product being developed was a scoring application and anemia education for prospective brides named botting macca which comes from the Bugis language and means smart bride, with this application the researchers hope that after the bride and groom use the application they can become smarter in acting especially in prevention and overcoming anemia.

3.2 Media Expert Test Validation, Material Expert Test Validation, and Small Scale Sample Trials

From the results of the application feasibility test answers, it can be assumed that the results of the assessment results from the media expert's assessment showed an average score of 3.25 in a good category (Table 2) in terms of media which includes application size, cover design and application content design is good, and Material experts showed an average score of 3.30 in a very good category (Table 3) in terms of material which includes aspects of content feasibility, presentation feasibility, presentation feasibility, language feasibility and contextual feasibility, and the respondent's assessment showed an average score of 3.63 in a very good category (Table 4) of the components of interest, material and language. Based on the results of the last description, it can be decided that

the suitability score of the Macca Botting Application product with a minimum score of 3.39 was classified into the "Very Good" category.

Table 2. The results of the media expert's test of the botting macca application for score detection and anemia education of the bride and groom

ASSESSMENT ASPECT	MEDIA EXPERTS	AVERAGE RATING
Application Size	3.5	3.5
1. Suitability of application size with ISO standards	3	
2. Suitability of size with the content of the application	4	
Cover Design	3.25	3.25
3. Appearance of layout elements	3	
4. Color layout elements	4	
5. The letters used are attractive and easy to read	3	
6. Application cover illustration	3	
Application Content Design	3	3
7. Consistency of appearance layout	3	
8. Printable and space layout elements	3	
9. Title layout elements and illustrations	3	
10. Embedding layout	3	
11. Typography of simple application contents	3	
12. Typography of the app content makes it easy to understand	3	
13. Content illustration	3	
Average	3.25	3.25 (Good)

Table 3. The results of the material expert's test on the botting macca application for score detection and anemia education in the bride-to-be

Component	EXPERT I	EXPERT II	Average rating
Content Feasibility Aspects	3,6	2,65	3,12
5. Material suitability	4	3,5	
6. Material accuracy	3,4	2,6	
7. Material finesse	3	2,5	
8. Encourage curiosity	4	2	
Presentation Feasibility Aspects	3,95	2,6	3,27
5. Presentation technique	4	3	
6. Serving support	3,8	2,4	
7. Presentation of learning	4	2	
8. Coherence and sequence of thought	4	3	
Aspects of Language Eligibility	3,8	3,2	3,5
6. Straightforward	4	4	
7. Communicative	4	3	
8. Diagnosis and interactive	4	3	
9. Conformity with development	3	3	
10. Compliance with language rules	4	3	
Aspects of Contextual Eligibility	3,65	3	3,32
3. Contextual nature	3,5	3	
4. Contextual component	3,8	3	
Average	3,75	2,86	3,30 (Very good)

Table 4. The results of the respondent's trial of the botting macca application for score detection and anemia education in the bride-to-be

Component	Average value
Interest	3,63
Theory	3,67
Language	3,6
Average	3,63 (Very good)

3.3 Large-Scale Sample Trials

In Table 5, it was found that the two groups of respondents who were prospective brides for the normal, high-risk and anemia categories most were 20-30 years old by 90% (18 respondents) with 10 respondents (50%) as private employment status.

Table 5. Description of Characteristics

Variable	Macca Botting Application							
	Normal		Highrisk		Anemia		Total	
Age	n	%	n	%	n	%	n	%
≤19 years	1	5%	-	-	1	5%	2	10%
20-30 years	6	30%	6	30%	6	30%	18	90%
≥30 years	-	-	-	-	-	-	-	-
Total							20	100%
Media Print Out								
≤19 years	-	-	-	-	-	-	-	-
20-30 years	8	40%	7	35%	5	25%	20	100%
≥30 years	-	-	-	-	-	-	-	-
Total							20	100%
Profession	Macca Botting Application							
	Normal		Highrisk		Anemia		Total	
Profession	n	%	n	%	n	%	n	%
IRT	1	5%	-	-	-	-	1	5%
entrepreneur	-	-	-	-	-	-	-	-
Private	2	10%	4	20%	4	20%	10	50%
PNS / Honorary	1	5%	-	-	2	10%	3	15%
Work / other	3	15%	2	10%	1	5%	6	30%
Total							20	100%
Media Print Out								
IRT	-	-	-	-	-	-	-	-
entrepreneur	-	-	-	-	-	-	-	-
Private	6	30%	6	30%	3	15%	15	75%
PNS / Honorary	2	10%	1	5%	2	10%	5	25%
Work / other	-	-	-	-	-	-	-	-
Total							20	100%

Based on table 6, it was found that the difference in the detection score of anemia scores in the prospective bride showed that the pre-test and post-test when using the botting macca application, all items decreased on average, while when using print out media, all items increased on average.

Table 6. Average Test Results Pre Test and Post Test Detection of Anemia Score

Item	Macca Botting Application		Media Print Out	
	Pre Test	Post Test	Pre Test	Post Test
5L (Sluggish, Tired, Weak, Tired, Inattentive)	14	1	9	11
Headache / dizziness	20	3	17	20
Firey eyes	7	0	3	4
Drowsiness	19	19	20	20
Tired quickly	19	18	20	20
Difficult to Concentrate	12	13	20	20
Face Pale	6	1	11	17
Pale of the Lower Eyelids	14	3	10	14
Pale on the lips	14	4	10	13
Pale to the skin	3	0	0	1
Pale on the Nails	11	2	5	10
Pale on the palms	4	0	0	0

Based on the results of table 7, it was found that the difference in status changed in the prospective bride showed the pre-test and post-test when using the botting macca application, all items on average from anemia and highrisk become normal, while when using print out media, all items on average experience changed from normal to high risk and from hypertension to anemia.

Table 7. Results of Pre Test and Post Test Monitoring of Anemia Education

Item	Macca Botting Application		Media Print Out	
	Pre Test	Post Test	Pre Test	Post Test
	Score (%)	Score (%)	Score (%)	Score (%)
Anemia	6 (30)	0 (0)	1 (5)	5 (25)
Highrix	8 (40)	2 (10)	11 (55)	10 (50)
Normal	6 (30)	18 (90)	8 (40)	5 (25)

In table 8, the results of the Man-Whitney statistical test obtained p value 0.001 < p value 0.05, so Ho is rejected, Ha is accepted, which means there was a difference in the effect of using the botting macca application for score detection and anemia education with print out media on the prospective bride. The result of the mean rank of the experimental group that was given botting macca application was 27.25, while the control group who was given print out media was 13.75.

Table 8. Mann-Whitney test

Media	N	Mean Rank	p-Value
Macca Botting Application	20	27.25	0,000
Print Out	20	13.75	

4. Discussion

The product being developed was a scoring application and anemia education for prospective brides named botting macca which comes from the Bugis language and means smart bride, with this application the researchers hope that after the bride and groom use the application they can become smarter in acting, especially in prevention and overcoming anemia. The following are some of the features contained in the macca botting application:

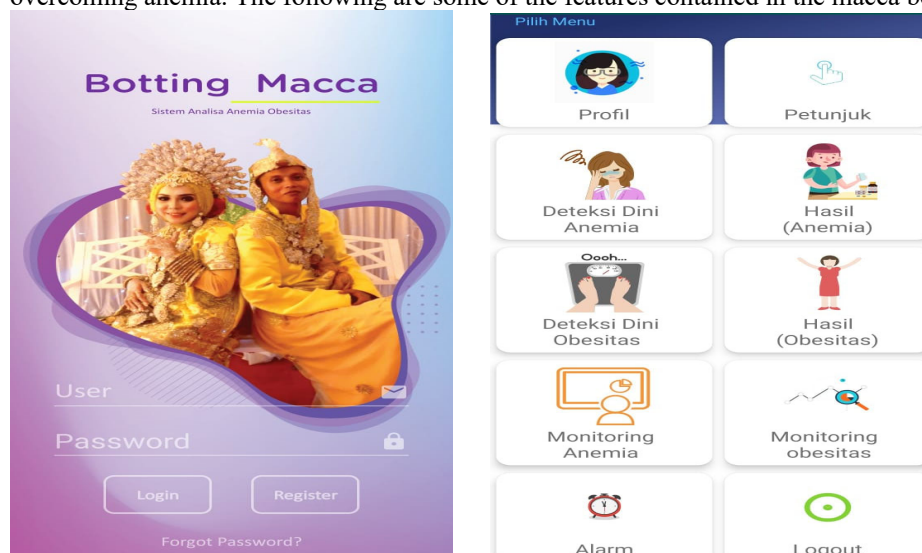


Figure 1. Menu entry and display of application features

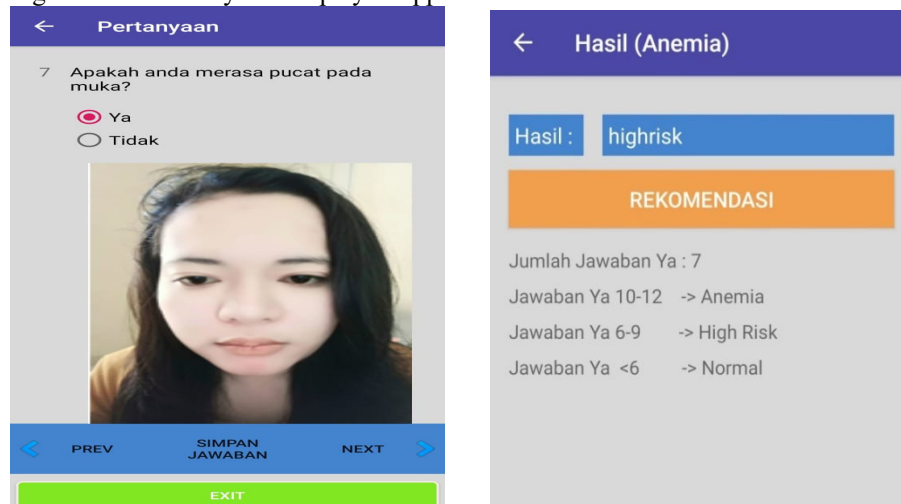
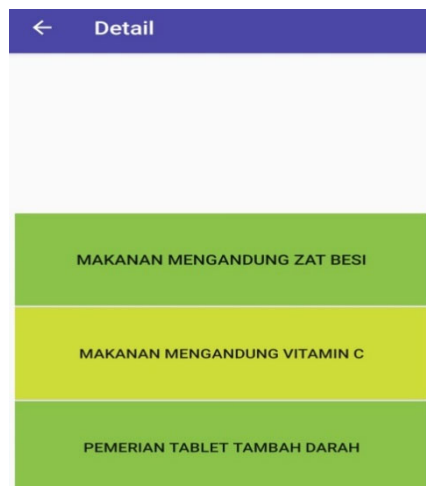


Figure 2. One question detection score and results of anemia status



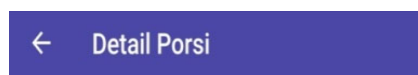
Jenis makanan	Porsi permenu	Konversi
Sumber nabati		
Kacang kedelai	50 gram	5 sdm
Kacang tanah	20 gram	2 sdm
Petai segar	20 gram	1 papan/ biji besar
Tahu	100 gram	2 potong sedang
Sari kedelai	185 gram	2,5 gelas
Tempe	50 gram	2 potong sedang

Sumber: Gill Sammie, 2017



Jenis Makanan	Porsi Permenu	Konversi
Anggur	165 gram	20 buah sedang
Apel merah	85 gram	1 buah kecil
Duku	80 gram	10-16 buah sedang
Durian	35 gram	1 biji besar
Jambu biji	100 gram	1 buah besar
Jeruk manis	100 gram	2 buah sedang
Kedondong	100-120 gram	2 buah sedang
Mangga	90 gram	1/2 buah besar
Manggis	80 gram	2 buah sedang
Melon	90 gram	1 potong
Nangka	50 gram	3 biji sedang
Pear	85 gram	1/2 buah sedang
Rambutan	75 gram	8 buah
Salak	65 gram	2 buah sedang
Semangka	180 gram	1 potong sedang
Pisang	50 gram	1 buah

Sumber: Buku terapi diet dan nutrisi (Mary Courtney Moore, 2012)



a. Pemberian Tablet Tambah Darah (TTD), diminum setiap 1 minggu sekali di waktu yang sama. TTD diminum bersama dengan sumber vitamin C (jeruk, papaya, mangga, jambu biji dan lain-lain), selama 2 jam sebelum dan 2 jam setelah minum TTD hindari mengonsumsi (Teh, kopi, tablet kalsium dan obat maag).



Figure 3. Anemia Education

How to fill in the detection of anemia scores is by downloading the botting macca application found on the Android plystore, then you can install the application and open the application in which there are several features as follows: user profile, instructions for using the application, detection of anemia scores, results and education of anemia, monitoring anemia, alarm reminders to drink blood plus tablet and logout menu. Furthermore, to run the application, users can open and fill in the user profile feature, open and understand the application usage instructions feature, select and open the anemia score detection feature in the botting macca application, Then the user selects the anemia score detection feature, which contains 12 questions for the detection of anemia scores and can fill in the 12 questions by choosing a yes or no answer according to what was experienced by the prospective bride. The more yes statements chosen, the greater the chance of anemia happened. Through the results of the calculation of the answers, the prospective bride can assess whether she was included in the category of risk of anemia or not. If the bride-to-be knew that she was at risk of anemia, it was hoped that she can be more vigilant

and apply the education contained in the anemia education feature in the botting macca application (MHN Sari and Anggraini 2020), early detection can prevent anemia in an effort to reduce AKI (Solehati et al. 2018), early detection efforts can be done in adolescents (DP Sari et al. 2020; Abdimas and Tasikmalaya 2019; Umriaty and Arti 2019; Putrianti and Krismiyati 2019) and early detection in pregnant women (Fitri and Machampang 2018; Sukmawati, Mamuroh, and Nurhakim 2019; Saryono nd)

From the results of the validation test by the media expert and material expert as well as the small sample trial, it can be assumed that the results of the material expert's assessment showed an average score of 3.30 (very good), while the media expert showed a score of 3.25 (good). The criteria for the assessment results in accordance with the results of the study were very feasible and can be used without revision (Candradewi, Saputri, and Adnan 2020).

The advantages possessed by this application are that the application display given an attractive animation on each feature so, it does not bore users. In addition, the content of the material contained in the application uses communicative language and easy to understand and is equipped with pictures, in the botting macca application it is also equipped with an alarm feature for drinking blood supplement tablets.

Based on the results of the research, in addition to the content of the material contained in the application using communicative language and easy to understand by the bride-to-be respondents which was proven by the assessment obtained by the researcher, the results showed that the average small-scale test recapitulation results on users of the botting macca application for score detection and anemia education for the bride-to-be with the interest components, material and language was at 3.63 in the very good category. So, the Macca botting application can be said to be suitable for use and does not need to be revised. After the botting macca application product for score detection and anemia education in the bride-to-be was categorized as feasible according to product testing by media experts, material and small-scale user testing, furthermore this botting macca application can be developed and given directly to bride-to-be respondents to measure its effect on score detection and anemia education for the bride-to-be.

In this study, the results of the description of the characteristics of the two groups of respondents to the prospective bride for the normal, high-risk and anemia categories most were 20-30 years old by 90% (18 respondents) in the group given the botting macca application and 100% (20 respondents) in the control group who was given print out media. In the two groups of respondents, the prospective bride and groom have the most work status as private as many as 10 respondents (50%) in the group given the botting macca application and as many as 15 respondents (75%) in the control group, these all from the normal, high-risk and high-risk categories, anemia.

These results were consistent with research conducted by Zahidatul & Trias (2017) that women aged <20 years have a risk of experiencing anemia 2,250 times compared to those aged 20-35 years, and those aged > 35 years have a risk of experiencing anemia 5.885 times greater than those aged 20-35 years old. Women who do not work have a risk of experiencing Anemia 1,990 greater than pregnant women who work (Zahidatul Rizkah and Trias Mahmudiono 2017).

This study found that the results of using the botting macca application were feasible to detect scores of anemia in prospective brides. This was in line with a number of studies conducted using applications as the main medium for early detection of women (MHN Sari and Anggraini 2020; Solehati et al. 2018; DP Sari et al. 2020; Abdimas and Tasikmalaya 2019; Umriaty and Arti 2019; Putrianti and Krismiyati 2019; Fitri and Machampang 2018; (Sukmawati, Mamuroh, and Nurhakim 2019)

This botting macca application used a score detection feature which contained 12 questions related to signs of anemia, including: 5L (tired, lethargic, weak, tired, inattentive), headache, dizzy eyes, easily drowsy, tired quickly, difficult to concentrate, pale on the face, pale on the lower eyelids, pale on the lips, pale on the skin, pale on the nails, pale on the palms of the hands. Respondents filled in the score detection item section on the botting macca application once a week. Based on the results of research conducted in the experimental group by given the botting macca application, of the 20 respondents the most answered yes to symptoms of easy drowsiness and tiredness, namely 19 respondents. Meanwhile, the control group was given print out media from the 20 respondents who answered yes to the symptoms of easy drowsiness, fatigue and difficulty concentrating, as many as 20 respondents. This was in line with research conducted by Julia in 2018 that anemia can be detected with several symptoms including 5L, dizziness, drowsiness, fatigue, difficulty concentrating, pale conjunctiva, pale lips and face (Fitrianty and Saputri 2018).

Based on the results of research conducted in the experimental group by given the botting macca application, of the 20 respondents the most were in the hygienic category, namely 8 respondents (40%) and decreased significantly for 4 weeks to 2 respondents (10%). Whereas the control group was given print out media from 20 respondents, the most were in the high-risk category, namely 11 respondents (55%) and after 4 weeks it decreased to 10 respondents (50%). This was in line with the study by Emma Tonkin (2017) who tested a smartphone application to improve nutrition in community settings, it was found that there was a change in behavior in food selection that affected a person's health condition (Tonkin, Brimblecombe, and Wycherley 2017).

This study found that the application of score detection and anemia education in the bride and groom-to-be was feasible and has the potential to be developed in increasing the behavior changed of the bride and groom. This was in line with the benefits and uses of mobile-based applications as an information medium in pregnancy, that most women use internet access to retrieve health information (Selvia and Ernawati 2019).

The results of the Mann-Whitney test with a p-value of $0.001 < 0.05$, in line with research which showed that there were significant differences in nutritional knowledge and levels of nutritional adequacy related to anemia prevention after nutrition education was given (Sefaya 2017).

Using applications compared to print outs made it easier for respondents to add education. The implication of this research was that it made it easier to study anemia material in the bride-to-be and it was proven to be able to increase the behavior changed of the bride-to-be so, this application was considered feasible and can be used as an educational medium. Various forms of application according to the times that are web-based and smartphone are proven to increase knowledge (Noverina, Dewanti, and Sitoayu 2020; Publication 2017; Fadhilah, Hartini, and Alit Gunawan 2017) Besides being able to increase knowledge, it can also have an influence on maternal attitudes related to anemia (Febrianta, Gunawan, and Sitasari 2019; Ferwanda and Muniroh 2017), and can increase the effectiveness of health promotion (Mahampang and Sari 2020; Rotua 2018; Putu Fani Yustisa, Aryana, and Suyasa 2012).

The availability of a score detection application and anemia education for the bride and groom was expected to have a positive impact in increasing public awareness, especially the bride and groom to do something that can help themselves related to anemia. If a person already has knowledge, with this knowledge he will have the ability to use the material he has learned in real situations and circumstances (Iron, Knowledge, and 2019).

5. Conclusion

Based on the development model of Borg & Gall, a product called an android-based botting macca application produced for scoring detection and education of anemia among aspirants. Based on the assessment of the expert test covering the components of application size, cover design, application content design, aspects of feasibility, presentation, language and context, the application of score detection and anemia education in the bride and groom was suitable for use without revision. Based on the pre and post test assessments for sample trials, the detection score and anemia education of the bride and groom were feasible to use without revision and were feasible to be developed.

Based on further development research, it was hoped that the components of score detection and education related to the health of the bride and groom can be developed so, they can add features in the botting macca application, add interesting anemia educational videos and can add HB diagnostic tests to confirm the results of detection of anemia scores, and can add symptom or symptom and sign or sign / indication in section 12 question in score detection feature.

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