DEVELOPMENT OF EDUCATIONAL GAME HERBAL MEDICINE COMPOUNDING BASED ON ANDROID

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ABSTRACT

The purpose of developing this herbal medicine compounding application is to provide information about medicinal plants, including the procedures for planting and compounding medicinal plants, as well as providing a medium that can facilitate the public to get information about medicinal plants. The research methodology was carried out from 4 stages, consisting of data collection (interviews, questionnaires, literature studies), the software development used was the Multimedia Development Life Cycle method according to Luther Sutopo Arc and application testing. The application built contains medicinal plant material and herbal medicine compounding simulations. Based on the results of testing herbal compounding applications at the Agricultural Extension Center, it can be concluded that the applications built are easily understood by the community, the applications built also provide herbal medicine compounding simulation features, which can help the community in making their own herbal remedies.

Keywords : Herbal Medicines, Agricultural Extension Centers, Educational Games, Adventure, Android.

1. INTRODUCTUION

Traditional medicine is a medicine that is processed traditionally, for generations, based on ancestral recipes, customs, beliefs, or local habits, both magic and traditional knowledge. According to current research, traditional medicines are indeed beneficial to health, and their use is now intensified because they are more accessible to the community, both in price and availability [1].

Traditional medicine is currently being abandoned by workers, especially in urban areas who have a tight work schedule. Consuming chemical drugs that are widely circulated in drug stores they choose because they are practical and easy to get, but there are some chemical drugs that have a mixture of chemicals that cannot be synthesized in the body, and now many circulating dangerous drugs or counterfeit drugs [1].

Agricultural Extension Center is a government extension institution based in the sub-district, while counseling itself is a non-formal education system or an educational system outside the usual school system, where people are shown ways to achieve something satisfactorily while the person is still doing it himself , so learn by doing it yourself. The existence of agricultural extension centers is very determined by government policies, both by the central and regional governments. According to agricultural science, agricultural counseling is a social science that studies the systems and processes of change that occur in individuals and communities so that they are realized much better in agriculture.

During this time the Agricultural Counseling Center conducted socialization using advertisements such as books, websites, banners, and / or conventionally by face to face such as lectures and using presentation slides. However, this was felt to be less efficient because accessing it was a bit of a cost and the Agricultural Extension Center could not provide socialization to the community at all times.

Based on these problems, it can be concluded that there is a need for a media that can assist the Agricultural Extension Center in disseminating the types of medicinal plants to the community in an interesting way. According to the results of previous research conducted by Irvan Nur Firdaus [2] which explained about drugs and Rifan Muhammad [3] which explained the compounding of medicinal plants, the results obtained were that educational games could help people to get the images contained in the book / in socialization material.

The results of the questionnaire given to 35 respondents, obtained 73% using Android and 27% using IOS. According to previous research, there were 41.02% of Android users in 2014. This proves that teenagers in Indonesia have considerable attention in the use of Android smartphones [4].

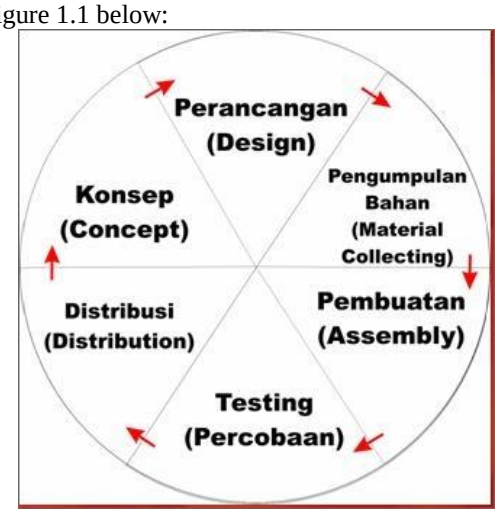
Based on the results of the problems that have been described, it is necessary to have a system in the form of an educational game "REQUIRING ANDROID-BASED HERBAL MEDICINE", in the hope that this game application can introduce the types of medicinal plants to the community, so that the community has the desire to plant medicinal plants in the surrounding environment, and can mix their own herbal remedies that are used to cure diseases that can be treated using herbal remedies.

1.1 *Game*

Games are a set of games that involve one or several players who have goals, restraints and consequences. Basically games are entertainment media for various groups. Games are different from other software. In the game the goal you want to get is to enjoy and enjoy the game. The game develops very rapidly starting from games that are only played alone to games that can be played by many people around the world simultaneously by using an internet connection as a liaison. Thanks to the rapid technological advancements now games can be played on smartphones with 3D graphics. Lately, mobile games are in great demand, which encourages game developers to create good games [5].

1.2 *Multimedia Development Life Cycle*

The method of software development in the development of this herbal medicine compounding educational game uses MDLC (Multimedia Development Life Cycle). A description of the Multimedia Development Life Cycle method according to Arch Luther [6], which can be seen in Figure 1.1 below:



Picture 1. Metode Multimedia Development Life Cycle[6]**.**

Penjelasan dari tahap-tahap model MDLC adalah sebagai berikut :

1. Concept

The concept stage is the stage to determine the purpose and who is the user of the program (audience identification). Application objectives (information, entertainment, training, etc.) and other general specifications.

2. Design

The design phase (design) is the stage of making detailed specifications regarding the program architecture, style, appearance and material for the program to be built.

3. Material Collection

The material collection stage (collecting material) is the stage of collecting materials that are in accordance with the needs of the program to be built. These materials, such as photos, animation, audio, and others.

4. Making

The assembly stage is the stage of making all multimedia materials and is combined together into a complete application.

5. Experiment

The testing phase is the stage that is carried out after completing the assembly by running the application or program and seeing whether there is an error or not. The first stage at this stage is also called the alpha (alpha test) testing stage where the examiner is done by the author himself, after passing the alpha test, beta testing is carried out involving the end user.

6. Distribution

The distribution phase is an evaluation phase for developing ready-made products, can be done by using the internet, LAN, WAN, and others.

2. CONTENTS OF RESEARCH

This section will discuss the problems to be analyzed, a general description of the system, the stages of each process and the results of the research.

2.1 Problem Analysis

Lack of information and education about medicinal plants given by the government to the community which causes low public knowledge about the advantages of medicinal plants. Lack of public knowledge about how to mix herbal medicines, because the way to mix herbal medicines is usually passed down and down by the ancestors, but not all ancestors could teach how to mix herbal medicines to their offspring. Lack of information about the cultivation of medicinal plants that are known by the community, thus making people not interested in cultivating medicinal plants. Information and education provided by the government is limited only through written media and socialization conducted by the Agricultural Extension Center, which includes books, websites, banners. However, the media is considered to be inefficient because accessing it is a bit of a cost and the Agricultural Extension Center cannot provide socialization to the community at all times. Based on the results of the questionnaire distributed to 35 community respondents, stating that 69% did not know about medicinal plants, either about planting or compounding, and respondents as much as 83% chose the game as a learning medium.

2.2 Analysis of Built Applications

The game that will be built is entitled "Perbat Herbal". This compounding educational game has a genre or type of adventure and time-management games. This game was built by presenting medicinal plant content, aiming to introduce, plant, and mix medicinal plants. conducted to design the game that will be built in this research. Following are the concepts and game descriptions of the Perbat Herbal educational game:

1. The player must complete the mission or quest from the professor to complete the game.

2. Players can carry out missions or quests by asking each villager.
3. Before the player receives a mission or quest, the professor will tell the problem first.
4. Each mission or quest has a different gameplay.
5. If the player fails in carrying out a mission or quest, the player can match it.
6. Players cannot run missions or subsequent quests, if the first mission or quest has not been completed and so on until the fifth mission.

2.3 Materi Analysis

Material analysis is done to find out what materials will be in the game to be built. Based on documents contained in the Agricultural Extension Center, the material that will be used in the construction of educational games for medicinal plants adjusts to the document. The following materials will be presented in the game to be built:

Tabel 1. Analisis Materi Tanaman Obat

No	Tanaman Obat	Nama Latin
1	Jeruk nipis	*Citrus aurantifolia*
2	Jeruk mandarin	*Citrus reticulata*
3	Lidah buaya	*Aloe vera*
4	Bawang Putih	*Allium sativum*
5	Bawang merah	*Allium cepa*
6	Daun mint	*Mentha piperita*
7	Jahe	*Zingiber officinale*
8	Kunyit	*Curcuma domestica*
9	Kencur	*Kaempferia galanga*
10	Daun kayu putih	*Melaleuca leucadendra*
11	Minyak Kelapa	*Cocos nucifera L.*

Tabel 2. Analisis Materi Bahan-Bahan

No	Nama Bahan	Digunakan untuk peracikan obat
1	Gula Aren	Maag
2	Madu	Batuk, flu, dan maag

Tabel 3. Analisis Materi Peracikan

Penyakit	Bahan	Cara pengolahan
Batuk	Jeruk nipis bawang putih madu lidah buaya	Iris dan peras jeruk nipis, lalu ambil airnya. Tumbuk bawang putih. Campurkan air jeruk nipis dengan tumbukan bawang putih dan beri sedikit air. Saring hasil ramuan sebelumnya. Tambahkan madu dan lendir lidah buaya pada air hasil saringan.
Flu	Jahe Jeruk mandarin Daun mint Madu	Parut jahe. Kupas jeruk mandarin untuk diambil kulitnya saja. Rebus parutan jahe dan kulit jeruk mandarin, lalu tambahkan daun mint. Saring rebusan tersebut untuk diambil airnya saja. Tambahkan madu ke dalam rebusan air tersebut lalu aduk sampai rata.
Sakit kepala	Daun kayu putih	Daun kayu putih direbus dalam 3 gelas air sampai tersisa 1 gelas
Demam	Bawang merah Jeruk nipis Minyak kelapa	Memotong bawang merah. Parut kencur. Iris dan peras jeruk nipis. Campurkan air jeruk nipis dengan tmbukan bawang merah dan 1 sendok makan minyak kelapa. Adukan campuran sampai rata.
Maag	Kunyit Kencur Daun mint Madu Gula aren	Parut kunyit. Parut kencur. Rebus parutan kunyit, kencur dan daun mint. Saring lalu ambil rebusan airnya. Parut gula aren. Tambahkan madu dan gula aren secukupnya.

2.4 Non Functional Needs Analysis

Non functional requirements analysis is the analysis used for system requirements specifications. System requirements specifications are detailed specifications related to things that will be built by the system, when implemented into a real environment. Non-functional needs analysis is divided into three, namely hardware requirements analysis, software requirements analysis, and user needs analysis.

1. Hardware Requirements Analysis

Hardware requirements analysis is intended to determine the hardware specifications used to run the Perbat Herbal educational game. The minimum hardware specifications on Android smartphones that users need to run the Perbat Herbal educational game are:

Tabel 4. Spesifikasi Minimum Perangkat Keras Smartphone

No	Perangkat Keras	Spesifikasi
1	Layar	4 inch
2	RAM	512 MB
3	Storage	4 GB

Hardware specifications used in the construction of proverbial educational games are:

Tabel 5. Analysis of Hardware Requirements for system Development

No	Perangkat Keras	Spesifikasi
1	RAM	2 GB
2	Storage	500 GB
3	VGA	1 GB

2. Analysis of Software Requirements

The following is an analysis of the software requirements of the system to be built. Software specifications for developers used in building the Perbat Herbal educational game are:

Tabel 6. Analisis Kebutuhan Perangkat Lunak

No	Perangkat Lunak	Nama Program
1	Operating System (OS)	Window 10
2	Program Pembangunan Aplikasi	2 GB
3	Program Pembuatan Material	Adobe Photoshop CS 3
4	Program Pemodelan UML	Visio 2010, Star UML 2.2
5	Program Perancangan Antar Muka	Balsamiq Mockups

3. User Analysis

In addition to the need for software and hardware, user analysis is needed as an indicator of users who can use this application. User specifications needed are:

Tabel 7. Analisis Kebutuhan Pengguna

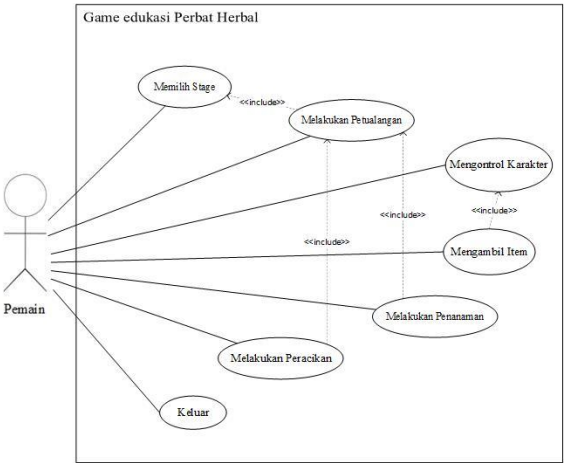
Pengetahuan dan Pengalaman Pengguna		
1	Pengetahuan Smartphone	Dapat mengoperasikan dasar-dasar smartphone
2	Pengalaman Sistem	Memahami instalasi aplikasi
3	Pengalaman Aplikasi	Dapat menggunakan aplikasi-aplikasi yang umum di smartphone
4	Pendidikan	SD (Sekolah Dasar)
5	Kemampuan Bahasa	Indonesia
6	Umur	12 tahun ke atas
7	Gender	Laki-laki & Perempuan
8	Penggunaan Tangan	Keduanya dalam kondisi baik
9	Disabilitas	Tidak

2. 5 Functional Needs Analysis

Functional needs analysis describes the process of activities that will be applied to the system to be built.

1. Use Case Diagram

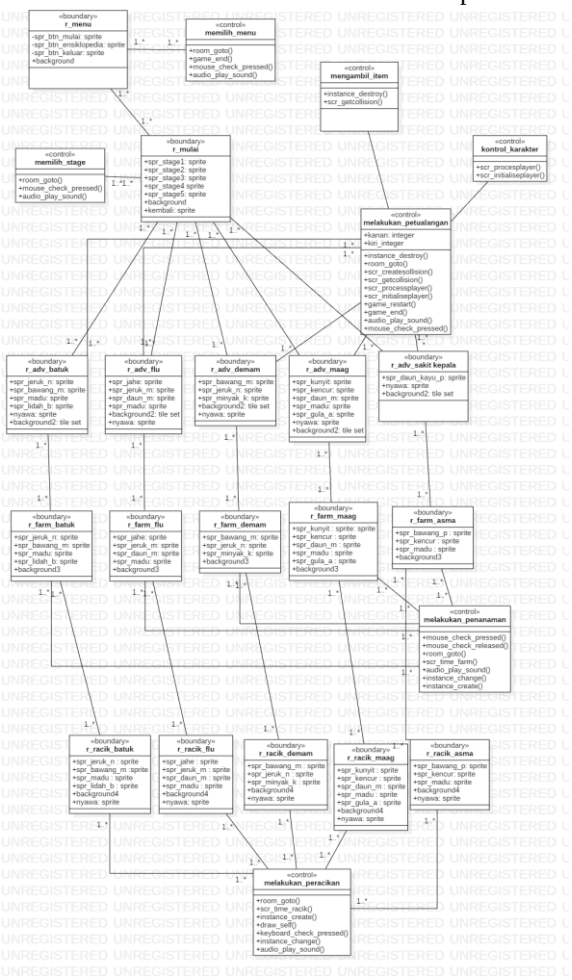
Use case diagram is a diagram to describe the relationships that occur between actors with activities contained in the system. The goal of use case modeling is to define the functional and operational needs of the system by defining the scenario of the system user to be built.



Gambar 2. Use Case Diagram

2. Class Diagram

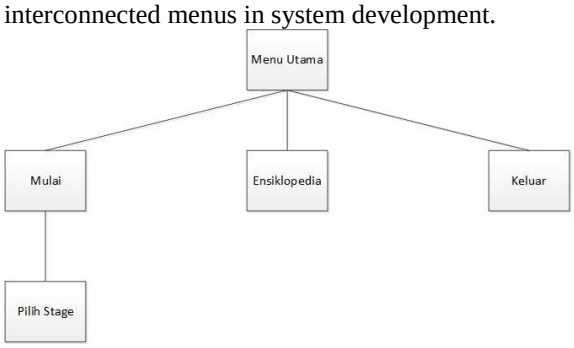
Class diagrams or class diagrams describe the structure of the system in terms of defining the classes that will be created to build the system. Classes have what are called attributes and methods or operations.



Gambar 3. Class Diagram

2.6 Menu Structure Design

Menu structure design is a depiction of interconnected menus in system development.



Gambar 4. Struktur Menu

2.7 Interface Implementation

The interface is the appearance of an application that is built as a means of interaction between the user and the application itself. Here are some interface views of the Perbat Herbal educational game.

1. The main menu interface in the educational game Perbat Herbal can be seen in Figure 5..



Gambar 5. Antarmuka Menu Utama

2. Antarmuka permainan pada *game* edukasi Perbat Herbal dapat dilihat pada gambar 6.



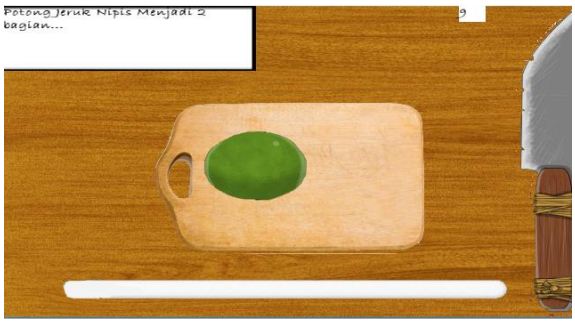
Gambar 6. Antarmuka Permainan

3. Antarmuka Permainan penanaman pada *game* edukasi Perbat Herbal dapat dilihat pada gambar 7.



Gambar 7. Antarmuka Permainan Penanaman

4. Antarmuka permainan peracikan pada *game* edukasi Perbat Herbal dapat dilihat pada gambar 8.



Gambar 8. Antarmuka Permainan Peracikan

2.8 Pengujian Sistem

Pengujian sistem bertujuan untuk menemukan kesalahan dan kekurangan pada sistem yang dibangun, sehingga apakah sistem tersebut sudah memenuhu kriteria sesuai dengan tujuan atau tidak. Adapun metode pengujian yang digunakan pada g*ame* edukasi Perbat Herbal adalah pengujian *performance*, pengujian *alpha* (*blackbox)* dan pengujian *beta* (Skala Likert).

1. Pengujian *Blackbox*

Pengujian *blackbox* dilakukan untuk menguji fungsionalitas sistem, apakah pada sistem tersebut masih ada kesalahan atau tidak. Berikut skenario pengujian *blackbox* pada *game* edukasi Perbat Herbal dapat dilihat pada tabel 9.

Tabel 8. Pengujian *Blackbox*

Kelas Uji	Detail Pengujian	Jenis Pengujian
Menu Utama	Memulai Permainan	*Blackbox*
	Ensiklopedia	*Blackbox*
	Keluar	*Blackbox*
Menggerakkan Karakter	Berjalan ke kanan	*Blackbox*
	Berjalan ke kiri	*Blackbox*
Pause	Tombol *pause*	*Blackbox*
	Tombol lanjutkan	*Blackbox*
	Tombol menu utama	*Blackbox*
	Tombol cara bermain	*Blackbox*

2. Pengujian Beta

Pengujian *beta* merupakan pengujian yang dilakukan secara objektif, dimana diuji secara langsung kepada pengguna atau pemain *game* edukasi Perbat Herbal dengan menggunakan teknik kuesioner. Berikut merupakan hasil dari pengujian beta

a. Pertanyaan : Penyajian informasi tanaman obat pada *game edukasi* Perbat Herbal mudah dipahami.

Tabel 8. Kuesioner No 1

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	9	45
Setuju	4	18	72
Ragu-Ragu	3	6	18
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**135**

Dari tabel di atas, maka persentase tingkat perseyujuan responden dapat dihitung sebagai berikut:

$$I = \frac{135}{165}\ x\ 100\%$$

$$I = 81{,}81\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 135 dan dari perhitungan persentasi didapat 81,81% dari nilai yang diharapkan sebesar 100%.

b. Pertanyaan : Penyajian informasi penanaman tanaman obat pada *game edukasi* Perbat Herbal mudah dipahami.

Tabel 9. Kuesioner No 2

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	7	35
Setuju	4	17	68
Ragu-Ragu	3	9	27
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**130**

Dari tabel di atas, maka persentase tingkat persetujuan responden dapat dihitung sebagai berikut:

$$I = \frac{130}{165}\ x\ 100\%$$

$$I = 78{,}78\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 130 dan dari perhitungan persentasi didapat 78,78% dari nilai yang diharapkan sebesar 100%.

c. Pertanyaan : Penyajian informasi peracikan tanaman obat pada *game edukasi* Perbat Herbal mudah dipahami.

Tabel 8. Kuesioner No 3

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	8	40
Setuju	4	16	64
Ragu-Ragu	3	9	27
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**131**

Dari tabel di atas, maka persentase tingkat perseyujuan responden dapat dihitung sebagai berikut:

$$I = \frac{131}{165}\ x\ 100\%$$

$$I = 79{,}39\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 131 dan dari perhitungan persentasi didapat 79,39% dari nilai yang diharapkan sebesar 100%.

d. Pertanyaan : Penyajian Materi dalam *game edukasi* Perbat Herbal mudah dipahami.

Tabel 8. Kuesioner No 4

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	7	35
Setuju	4	19	76
Ragu-Ragu	3	7	21
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**132**

Dari tabel di atas, maka persentase tingkat perseyujuan responden dapat dihitung sebagai berikut:

$$I = \frac{132}{165}\ x\ 100\%$$

$$I = 80\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 132 dan dari perhitungan persentasi didapat 80% dari nilai yang diharapkan sebesar 100%.

e. Pertanyaan : Dengan *game* edukasi Perbat Herbal menarik untuk dimainkan.

Tabel 8. Kuesioner No 5

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	9	45
Setuju	4	19	76
Ragu-Ragu	3	5	15
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**136**

Dari tabel di atas, maka persentase tingkat perseyujuan responden dapat dihitung sebagai berikut:

$$I = \frac{136}{165}\ x\ 100\%$$

$$I = 82{,}42\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 136 dan dari perhitungan persentasi didapat 82,42% dari nilai yang diharapkan sebesar 100%.

f. Pertanyaan : Dengan *game* edukasi Perbat Herbal menarik untuk dimainkan.

Tabel 8. Kuesioner No 6

Kategori Jawaban	Skor	Responden	Jumlah Skor
Sangat Setuju	5	9	45
Setuju	4	13	52
Ragu-Ragu	3	11	33
Tidak Setuju	2	0	0
Sangat Tidak Setuju	1	0	0
Jumlah		**33**	**130**

Dari tabel 4.19, maka persentase tingkat perseyujuan responden dapat dihitung sebagai berikut:

$$I = \frac{130}{165}\ x\ 100\%$$

$$I = 78{,}78\%$$

Dari perhitungan tersebut, jumlah skor yang didapat adalah 130 dan dari perhitungan persentasi didapat 78,78% dari nilai yang diharapkan sebesar 100%.

3. PENUTUP

Pada Bagian ini akan dikemukakan kesimpulan yang diperoleh dari pembahasan bab-bab sebelumnya serta saran yang bertujuan untuk perbaikan dan pengembangan aplikasi *game edukasi* Perbat Herbal selanjutnya

3.1 Kesimpulan

Berdasarkan hasil pengujian dan implementasi sistem dari penelitian yang dilakukan serta mengacu pada tujuan penelitian, maka dapat disimpulkan bahwa aplikasi *game edukasi* Perbat Herbal dapat menjadi media belajar dan memberikan pengetahuan tentang tanaman obat, penanaman tanaman obat dan peracikan obat herbal kepada masyarakat.

3.1 Saran

Berikut ini beberapa saran dari pembangunan *game* edukasi Perbat Herbal guna untuk pengembangan lebih lanjut, antara lain sebagai berikut :

1. Materi tanaman obat dan peracikan tanaman obat dapat diperbanyak lagi, guna menambah pengetahuan tentang tanaman obat agar lebih lebih luas.
2. Materi penanaman obat herbal dapat diperbanyak, agar dapat meningkatkan ketertarikan masyarakat untuk menanam tanaman obat.
3. *Performance* aplikasi dapat ditingkatkan lagi agar lebih stabil dan tidak terjadi *lag*.

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