DEVELOPMENT OF LINE CHATBOT AS A LEARNING MEDIA FOR MATHEMATICS NATIONAL EXAM PREPARATION (CASE STUDY IN SMA NEGERI 1 CIMahi)

Gisty Amelia Febriani¹, Richi Dwi Agustia²

¹,² Informatics Engineering – Indonesian Computer University
Jl. Dipati Ukur 112-116 Bandung
E-mail: gistyamelia@gmail.com¹, richi@email.unikom.ac.id ²

ABSTRACT

SMA Negeri 1 Cimahi an upper secondary school level, to be able to graduate from high school, students are required to take the National Exam. Preparation for Trial national is stabilization and tryouts. Results try out math obtain the lowest value. The obstacles faced by students also are strengthening the books are used heavily, because the large size and thick. And the difficulty in finding materials and matter. LINE chatbot application it is developing the National Math Exam preparation, with the aim of increasing the value of the try out Math, ease the burden of congenital, as well as facilitate the search for materials and matter. In the test results, the chatbot is applied to an experimental class can produce higher test scores by an average margin of 0.9 points from regular classes (conventional). On the results of questionnaires given in class are applied chatbot, said chatbot built to help prepare the National Math Exam with a score of 618 in the category of attitude that is positive. As well as the accuracy of the test results chatbot and blackbox testing done already achieving its development objective.

Keywords : Chatbot, High School, National Exam, Stabilization, Try Out.

1. INTRODUCTION

SMA Negeri 1 Cimahi is the first high school in Cimahi. SMA Negeri 1 Cimahi equal to the high school in general in Indonesia, has a period of education within three years. To pass the high school level, students are required to take the National Examination and Exams. National Exam is the evaluation system to establish a national standardization of education aimed as mapping the problem of education in order to formulate a national education policy [1].

Based on interviews with the SMA Negeri 1 Cimahi, to prepare for the National Exam, the school made preparations by organizing the establishment and try out. Stabilization of the National Examination preparation effort by doing exercises and discussion material. Books stabilization is used, contains a summary of the material as well as the National Exam sample questions that are tailored to SKL (Graduate Competency Standards). The second preparation is a try out. Try out a stage rehearsal and evaluation of learning outcomes towards the implementation of the National Examination [2]. Benefits of the try out is to prepare students to face the National Examination, familiarize students to be more diligent in learning, introduce students to various types of problems, and can be used as parameters of the student's ability [3].

Based on the information provided by the school, the results of which have been carried try out the academic year 2018/2019 students majoring in science consisting of 7 classes, math obtain the lowest value compared to other subjects with average scores on the first try out is 51, try out the two is 53, and try out the third was 61 value is still below the standard value of 70.

Based on the results of a questionnaire that has been distributed by the researchers, there are constraints faced by the students of SMA Negeri 1 Cimahi in carrying out the preparation of the national exam that is because the book consolidation is always used and should always be taken, students complained about the burden of congenital they become more severe, because the size of the book stabilization the large and thick.

In the current technological developments there are many studies that utilize chatbot as a medium to overcome a problem [4]. Chatbot on education can be used as a medium of learning as a presenter development of resource materials and an interactive and interesting question [5]. Chatbot technology as a learning medium to facilitate communication between users and computers in search of information [6]. Chatbot can also provide information quickly and efficiently [7]. Then the results obtained from a study of the application of the chatbot to media
learning OOP material, resulting in that media with
the application of the chatbot can attract student
interest in teaching and learning activities [8]. As well
as of a result of testing on the chatbot's research on
the application of instructional media, can
menghasilan final exam score higher results with an
average difference of 0.60 points from conventional
study group [5].

Based on the existing problems and the excess
application of the chatbot to address the problem, the
authors will apply chatbot as a learning medium
preparation for the National Examination in SMA
Negeri 1 Cimahi with the title "Application
Development chatbot As Media Learning Exam
Preparation National Math-Based Android (Case
Study in High School Negeri 1 Cimahi) ".

The intent and purpose of this thesis is as follows:
1. Help students improve grades tryout
Mathematics.
2. Take load congenital students with books
summarizing the national exam preparation
Mathematics.

2 RESEARCH CONTENTS
2.1 Chatbot
Chatbot is a computer program that processes
natural language input from the user and generates
relatively intelligent response is then sent back to the
user. Currently chatbots powered by engine driven by
rules or artificial intelligence engine (AI) that
interacts with the user via a text-based interface. It is
an independent computer program that can be
plugged into one of several messaging platforms that
have been opened to developers through APIs like
Facebook Messenger, Slack, Skype, Microsoft Team,
and so on [9].

2.2 Instructional Media
Learning media is anything that can be used to deliver
a message from sender to receiver. In this case the
process of stimulating thoughts, feelings, concerns,
and interests as well as the students' attention so that
the learning process can be established. Based on the
statement can be concluded that the media is a
learning tool used by teachers as a teaching aid. In the
interaction of learning, teacher gospel message in the
form of learning materials to students [10].

2.3 Modeling Software Development
Software development model using the model
APPED, consisting of, analysis and initial research,
design, production, evaluation, and dissemination.
Stages in APPED models can be seen in Figure 1.

2.4 Analysis and Research Beginning
2.4.1 Needs Analysis
The system will be built in the form of interactive
multimedia for education. This system has a purpose
and the target of increasing the value of the try out
math, which can encapsulate kesuluruhan ma
terials

Figure 1 Software Development Methods

Figure 2 Average Value of Mathematics Try Out

2.4.2 Concept Analysis System
The system was built named "HaloMath".
HaloMath can be used, when the user has a chat
application on the smartphone LINE, has added the
account "HaloMath" became friends, and connected
to the Internet. HaloMath can be used in a chatroom
in private or
groups. To be used as a group account "HaloMath" should be added first to an existing group.

### 2.4.3 Analysis Application Description

Here can be seen the outline of workflow applications to be built in Figure 3

**Figure 3 Application Description**

Here can be seen the description of front-end workflow in Figure 3:
1. Users send a message to the chatbot
2. LINE request would be forwarded to the Messaging API via the internet.
3. LINE Messaging API then forward the request to the server chatbot.
4. Chatbot will access the database and perform a search response.
5. Responses found in the database.
6. Then the response of the message will be sent to the LINE Messaging API via an endpoint that is WebHook.
7. The response will be forwarded and displayed on platform LINE over the internet.
8. The response is displayed to the user on the LINE platform.

Here can be seen the description of the back-end workflow in Figure 3:
1. Users perform data processing chatbot on the website provided.
2. Then the order will be processed.
3. After the command is processed, then the data will be transmitted and stored into the database.

### 2.4.4 System Architecture Analysis

The system architecture consists of user, device, internet, message content, message and discussion questions, photos, LINE Messaging API, Server, and Database. Content of HaloMath created using Adobe Photoshop. Users can use the application HaloMath to get the material, and the discussion about the preparation of the National Examination in Mathematics, as well as instructions of use.

Here can be seen a overview of the system architecture built in Figure 4

**Figure 4 System Architecture**

Analysis of the input of the message will be explained as follows:
1. Users send a message to the chatbot, for example in the form of a text message that read, "I want the material sets.", Can be seen in Figure 5

**Figure 5 Send Message**

2. LINE request would be forwarded to the Messaging API via the Internet, with data in JSON format, can be seen in Figure 6

**Figure 6 LINE to LINE Messaging API**

3. LINE Messaging API server then forwards the request to the chatbot, can be seen in Figure 7

**Figure 7 LINE Messaging API to Server**
Analysis of output messages will be explained as follows:
1. Once the template is found a template that will be the response of the message.
2. Then the responses have been found will be sent to the LINE Messaging API from a server, it can be seen in Figure 8

![Figure 8 LINE Messaging Server to the API](image)

3. The response will be forwarded to the LINE platform via the Internet, can be seen in Figure 9

![Figure 9 LINE Messaging API to LINE](image)

4. The response will be displayed on the LINE platform through, can be seen in Figure 10

![Figure 10 Response Displayed](image)

2.4.5 Use Case Diagram
Here is the use case diagram Chabot system which can be seen in Figure 11

![Figure 11 Use Case Diagram](image)

2.5 System planning
2.5.1 Designing Interfaces
Interface design greeting message can be seen in Figure 12

![Figure 12 Interface Design](image)

The design of the interface can request materials seen in Figure 13

![Figure 13 Interface Design](image)

Designing a menu rich interface can be seen in Figure 14

![Figure 14 Interface Design](image)
2.5.2 Menu Structure
The design of the menu structure can be seen in Figure 15

![Figure 15 Menu Structure](image)

2.5.3 Semantic Network
Semantic networks can be seen in Figure 16

![Figure 16 Semantic network](image)

2.6 Implementation
Implementation is the stage of software development. At this stage will explain the system implementation and explanation of the implementation environment.

2.6.1 Hardware Implementation
Hardware specifications that are used to using the system can be seen in Table 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Specification</th>
<th>Android</th>
<th>IOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Processor</td>
<td>Dual Core 1.5 GHz</td>
<td>Dual Core 1.3 GHz</td>
</tr>
<tr>
<td>2</td>
<td>RAM</td>
<td>1GB</td>
<td>1GB</td>
</tr>
<tr>
<td>3</td>
<td>storage</td>
<td>free Space 100MB</td>
<td>free Space 250MB</td>
</tr>
</tbody>
</table>

2.6.2 Software Implementation
Software specifications that are used to using the system are given in Table 2

<table>
<thead>
<tr>
<th>No.</th>
<th>Device</th>
<th>chatbot</th>
<th>website</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operating System</td>
<td>Android 4.4 or iOS 10.0 or more</td>
<td>Windows 10</td>
</tr>
<tr>
<td>2</td>
<td>Program</td>
<td>LINE 8.11.0+ (Android) LINE 7.16.0+ (IOS)</td>
<td>Chrome</td>
</tr>
</tbody>
</table>

2.6.3 Server Software Implementation
Server on the construction of the system used for uploading data from the chatbot. Here are the specs of the server can be seen in Table 3

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Domain Name</td>
<td><a href="http://www.halomath.online">www.halomath.online</a></td>
</tr>
<tr>
<td>2</td>
<td>Storage</td>
<td>10 GB</td>
</tr>
<tr>
<td>3</td>
<td>Bandwidth</td>
<td>100 GB</td>
</tr>
<tr>
<td>4</td>
<td>Subdomains</td>
<td>2</td>
</tr>
</tbody>
</table>

2.6.4 implementation interface
Implementation of the interface can be seen in Figure 17

![Figure 17 Implementation Interface](image)
Implementation of the interface can be seen in Figure 18

Figure 18 Interface Implementation

Implementation of the interface can be seen in Figure 19

Figure 19 Interface Implementation

2.7 Testing Systems
System testing is performed to determine whether the software is built meets the criteria or is in conformity with the purpose of research or not.

2.7.1 Black Box Testing
Black box testing to be done on this application can be seen in Table 4

<table>
<thead>
<tr>
<th>No.</th>
<th>Components tested</th>
<th>Scenario Testing</th>
<th>Type Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Add HaloMath</td>
<td>Add account HaloMath as a friend</td>
<td>Black Box</td>
</tr>
<tr>
<td>2</td>
<td>Displays Greeting Message</td>
<td>Displays the greeting message</td>
<td>Black Box</td>
</tr>
<tr>
<td>3</td>
<td>Displays List of Materials</td>
<td>Displays list of materials</td>
<td>Black Box</td>
</tr>
<tr>
<td>4</td>
<td>Featuring List Problem</td>
<td>Displays a list of questions</td>
<td>Black Box</td>
</tr>
<tr>
<td>5</td>
<td>Displays hint</td>
<td>Displays hint</td>
<td>Black Box</td>
</tr>
<tr>
<td>6</td>
<td>Displaying Content</td>
<td>display material</td>
<td>Black Box</td>
</tr>
<tr>
<td>7</td>
<td>Displays Question</td>
<td>Displays question</td>
<td>Black Box</td>
</tr>
<tr>
<td>8</td>
<td>Showing Discussion</td>
<td>Showing discussion</td>
<td>Black Box</td>
</tr>
<tr>
<td>9</td>
<td>Displays Exam</td>
<td>Displays exam</td>
<td>Black Box</td>
</tr>
<tr>
<td>10</td>
<td>Saving Answers</td>
<td>Saving jawabanke database</td>
<td>Black Box</td>
</tr>
</tbody>
</table>

Based on the results of black box testing has been done can be concluded that the system has met its development objectives.

2.7.2 Reaction Evaluation (Level 1)
A learning media can be considered successful when students are satisfied with the strategy of instructional media used. Evaluation will be done by reaction of the distribution of questionnaires. Likert scale calculations based on the answers of the respondents had the following steps:
1. Specifies the maximum score is:
   The Max score = score x number of respondents = 5 x 5 x 38 = 950
2. Determining the minimum score is:
   Min smallest score = score x number of respondents = 1 x 5 x 38 = 190
3. Determining the median value, namely:
   Median value = (max score + score min) / 2 = (950 + 190) / 2 = 570
4. Determining the value of quartile 1, namely: Quartile 1 = (score min + median value) / 2
   = (190 + 570) / 2 = 380
5. Determining the value of quartile 3, namely: Quartile 3 = (max score + median value) / 2
   = (950 + 570) / 2 = 760
6. Determining the scale obtained as Figure 20

   Figure 20 Likert Scale

Creating a boundary score based on previous calculations and can be seen in Table 5

<table>
<thead>
<tr>
<th>Category</th>
<th>Score limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Negative</td>
<td>190 ≤ x ≤ 380</td>
</tr>
<tr>
<td>Negative</td>
<td>380 ≤ x ≤ 570</td>
</tr>
<tr>
<td>Positive</td>
<td>570 ≤ x ≤ 760</td>
</tr>
<tr>
<td>Very Positive</td>
<td>760 ≤ x ≤ 950</td>
</tr>
</tbody>
</table>

a. Category Very Positively, the area bounded by the third quartile and score maksimal (quartile 3 ≤ x ≤ score maksimal).
b. Positive category, which is the area bounded by the median and the third quartile (median ≤ x <quartile 3).
c. Negative categories, namely the area yangdibatasi by quartiles 1 and median (quartiles 1 ≤ x <median).
d. Category Very Negative, i.e., the area bounded by the minimum score and quartile 1 (minimum score ≤ x <quartile 1).

Results of the evaluation of the reaction is the result of each answer a questionnaire filled out by the respondents can be seen in Table 6

<table>
<thead>
<tr>
<th>Category Answers</th>
<th>Agree</th>
<th>Total</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>5</td>
<td>280</td>
<td>0.9</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>304</td>
<td>1.3</td>
</tr>
<tr>
<td>Enough</td>
<td>3</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Not Agree</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Very not</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Based on the scores obtained from the questionnaire 37 respondents, total score was 618. Based on the attitude category into a positive attitude. It can be concluded that the respondents can be facilitated by the application chatbot HaloMath.

2.7.3 Evaluation of Learning (Level 2)
Measuring the effectiveness of a medium of learning, it is necessary for the evaluation of learning. Assessment evaluation of learning more leads on the assessment results (output) study. Evaluation study on the evaluation model of Kirkpatrick Model is conducted by post-test in two different classes. The first class uses a system built (experimental class) and second class using conventional learning methods (regular grade). Here can be seen in Table 7 post test results of these two classes.

<table>
<thead>
<tr>
<th>Student</th>
<th>Score</th>
<th>Frequency</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Experiment</td>
<td>3</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>81</td>
<td>2.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student</th>
<th>Score</th>
<th>Frequency</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Regular</td>
<td>3</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>47</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Difference 0.9

It can show that a given class media that is built has a higher value of 0.9 points compared to the regular classroom. It can be concluded that the system established has met its development objectives.

3. COVER
3.1 Conclusion
The conclusions of this thesis is as follows:
1. Students are given the chatbot system can result in a higher value of 0.9 points compared to students who learn by conventional.
2. Students can be facilitated by the chatbot system to obtain information on national math test preparation material, from the evaluation of the reaction with an evaluation score is 618 which goes into a positive attitude.
3.2 Suggestion

The suggestions for further development of this system is as follows:

1. Admin must frequently update the content of the chatbot, for the system to be up to date.
2. Because in a common typing error (typo) it is advisable to add sophisticated text-matching method, so that more accurate response.
3. So that the interaction is more like a conversation between people, then you can add a reminder feature names and others.

BIBLIOGRAPHY