Establishing an android-based integrated sciences glossary for junior high school students

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Abstract. Preliminary field research revealed the requirement of an interactive and supportive learning media for the Integrated Science course. Therefore, this research aimed at producing a valid and practical glossary of Integrated Science. The Four-D (Define, Design, Develop and Disseminate) method was applied in this research. Materials expert, media expert, and teacher have validated the product; also, tested in One-to-One Trial, Small-Scale Trial, and Field Trial which included respectively three, twelve, and thirty VII grade students. The product validity scored 4.21 and categorised as “excellent” while the product practicality value was 4.45 and categorised as “excellent”. The research product named “Integrated Sciences Glossary” is in the Application Package File (.apk) format and could be downloaded freely on the Google Play Store. This glossary consists of scientific terms equipped with explanations in both English and Indonesian. The students showed their enthusiasm in using the application for its ease. Other than that, this Android-based glossary is convenient to be used outside classroom learnings.

1. Introduction
By the time being, the Indonesian junior high school level learning system adheres to the 2013 curriculum. One crucial point is that science learning is held in an integrated manner. Science subject is no longer independently and separately taught such as physics, chemistry, and biology. Nevertheless, appropriate learning strategies and learning media are demanded to create successful and harmonious integration [1,2].

Establishing learning media should be taken into account. Several findings of research support this issue. Through interviews, junior high school students revealed that they were in need of media to consult science terms with as there are numerous new concepts they have never heard before. Other than that, the learning media should be exciting and easy to use. The same thing was also stated by teachers acting as the interviewee of the research. They said that a learning media is needed to support the students’ self-regulation particularly in understanding scientific terms and concepts. Therefore, it would facilitate learning.

In line with this, literature reviews inspired an alternative solution about media specification to support independent learning, that is an Android-based learning media [3,4]. The use of the Android system has been a familiar thing for people of this era [5], and junior high school students are no exception. The use of technology, including the Android system, is needed to adapt to trends and times in order to operate in times of change [6].
Android system-based learning media can be a means of navigating learning by students. Learning should facilitate students to improve their navigation skills in an increasingly fast changing world [7]. Android system technology is very worthy of consideration for developing learning media. This is also supported by the popularity of mobile devices that have become the choice of the general public [8], including at the age of students. Another supporting factor is the large number of mobile devices which allows a direct impact on the visual design industry [9-11]. On the other hand, the integration of internet-based technology into education can drive changes in conventional learning directions, namely changes in the role of educators. Educators are no longer distributors of learning content but will play more roles as facilitators of education [12].

Based on the above explanation, the researchers intended to develop an Android-based learning media covering interpretation of terms in integrated sciences learning for junior high school level. The application is expected to be a means for students to comprehend scientific terms to help them understand concepts, theories, and laws in the subject matter.

2. Methods

This study was a Research and Developmental one referring to the Four-D steps as shown in Figure 1.

![Figure 1. The four-developmental stages](image)

The first stage, define, covered preliminary research of need analysis. The researchers observed the 2013 curriculum documents, did literature reviews and interviews with either students or teachers. The design phase consisted of media selection, instrument arrangement, and schedule preparation. The initial product was established in the develop stage. Following the product development, validation was done by the material expert, media expert, and educational practitioner (teacher). The focus of product assessment was its validity and practicality.

Some suggestions for improvement by the validators were taken into account for the initial product revision until this product was worth testing. The product was tested on VII graders of SMP Negeri 10 Salatiga, Indonesia. The stages of product testing included one-to-one trial involving three students, small group trial involving twelve students, and field trial involving thirty students. The test results were referred to as the materials for final product revision. The last stage was disseminate, the product distribution.

The developed product would have been declared feasible if it obtained a minimally “good” category for validity and practicality aspect. The validity aspect included quality of program, graphic design and aesthetic as well as ease of use. On the other hand, the validity aspect included content and presentation. The obtained assessment results were then converted based on the following score conversion rate.

| Score Interval | Category     |
|----------------|--------------|
| X> 4,2         | excellent    |
| 3,4 <X≤ 4,2    | very good    |
| 2,6 <X≤ 3,4    | good         |
| 1,8 <X≤ 2,6    | fair         |
| X≤ 1,8         | poor         |

Information: X = Actual Score
3. Results and Discussion

3.1. The Product Development

This Research and Development study has established an Android application entitled “Integrated Sciences Glossary” packed in 5.6 MB of Application Package File (.apk) format. The app is available on the Google Play Store. It is free for download and convenient for both online and offline usage.

The glossary covers 496 scientific terms equipped with explanations in two languages; Indonesian and English. Students or users could look for the terms easily by typing on the provided navigation panel. The terms have been adjusted with the Integrated Sciences learnings for VII-IX grade so that it could support learnings in those classes.

The icon of the application is displayed in Figure 2. Figure 3 shows the search result through the Google Play Store. Once the application is installed, an opening page will pop up as in Figure 4. The glossary display and the term explanation are respectively represented in Figure 5, 6, and 7.

![Figure 2. The icon of application](image)

![Figure 3. The search result on Google Play Store](image)

![Figure 4. Opening page](image)

![Figure 5. Glossary display](image)

![Figure 6. Term explanation](image)

![Figure 7. Term explanation](image)
3.2. Product Validity

The Integrated Sciences Glossary developed in this study has been assessed by the experts for its validity and practicality. The validity scored 4.21 and classified as “excellent” while the practicality got 4.45 and categorised as “excellent”. Therefore, the application is said to be valid and practical. The average scores for validity and practicality aspect are presented in Figure 8 and 9.

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**Figure 8.** The average value of each product’s validity aspect

**Figure 9.** The average value of each product’s practicality aspect
Furthermore, the product was revised based on the experts’ and educational practitioner’s advice. The suggestions were: (1) the presented terms should cover all integrated sciences subject for VII to IX grade; (2) the number of terms should be augmented; and (3) maintenance and data update should be periodically done.

After the product was revised and declared worthy of use, trials were performed orderly from one-to-one, small-scale, and field trial. Figure 10 presents the students’ responses in each test. The average score for each trial was respectively 4.43, 4.47, and 4.48. All of them were categorised as “excellent”.

![Figure 10. One-to-one, small-scale, and field trial results](image)

The increase in the students’ response in each trial showed a positive influence of the revision done after every test. The favourable increase was also experienced by other studies. Other than that, the students also stated that they were happy and helped by the media as it made it easy for them to consult new terms. Moreover, the bilingual explanation also supported the students’ English skill in science classes.

4. Conclusion
The research concluded that the Integrated Sciences Glossary is feasible to be used as learning media for junior high school level. The validation by the material expert, media expert, and teacher showed that the average values of validity and practicality were 4.21 and 4.45 respectively or categorised as “excellent”. Moreover, the averages of students’ response obtained during the one-to-one, small-scale, and field trial were respectively 4.43; 4.47; and 4.48 which also classified as “excellent”.

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