BIO-INOVED
Jurnal Biologi-Inovasi Pendidikan
Volume 5, Issue 1, February 2023 page. 28-34

P-ISSN : 2684-9062 | E-ISSN : 2714-9803
https://ppjp.ulm.ac.id/journal/index.php/bino
DOI: 10.20527/bino.v5i1.14533

Validity of teaching materials of sub-concepts of structure and function plants tissue in high school based on android applications

Noorhidayati *, Riya Irianti, Siti Norridzati

Study Program of Biology Education, Faculty of Teacher Training and Education, Universitas Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia

**Corresponding Author Email:* riyairiantipbiounlam@ulm.ac.id

Article Information

Keyword:
Validity analysis; Teaching materials; Plant tissue structure; Function of plant tissue; Android application

Kata Kunci:
Analisis validitas; Bahan ajar; Struktur jaringan tumbuhan; Fungsi jaringan tumbuhan; Aplikasi android

History:
Received : 07/10/2022
Accepted : 29/01/2023

Abstract

The validation process is crucial in developing teaching materials to see the suitability of teaching materials with the expected learning outcomes. Teaching materials that have been declared valid can be used in the learning process. Technology-based teaching materials such as android application-based ones are one of the alternative teaching materials suitable for use in the learning process in the era of society 5.0 education. This study aimed to analyse the validity of teaching materials for the sub-concept of the structure and function of tissues in plants in high schools based on android applications. A quantitative descriptive research method was employed to find information on the validity of the teaching materials compiled. The study used a 4D development model. The subjects of the validity data were three validators (expert judgment), namely two lecturers and one partner teacher. The results showed that the teaching materials compiled obtained a suitability score of 4.45 and the results of the feasibility test of 4.35. Hence, the average validity score was 4.4, with a very valid category. The valid android application-based teaching material is feasible in the learning process with more flexibility.

Abstrak

Proses validasi pada pengembangan bahan ajar diperlukan untuk melihat kesesuaian bahan ajar dengan capaian pembelajaran yang diharapkan. Bahan ajar yang telah divalidasi dan dinyatakan valid dapat digunakan dalam proses pembelajaran. Bahan ajar berbasis teknologi seperti berbasis aplikasi android merupakan salah satu alternatif bahan ajar yang sesuai untuk digunakan pada proses pembelajaran di era pendidikan society 5.0. Tujuan penelitian ini adalah menganalisis validitas bahan ajar sub konsep struktur dan fungsi jaringan pada tumbuhan d SMA berbasis aplikasi android. Metode penelitian deskriptif kuantitatif, untuk menemukan informasi validitas bahan ajar yang disusun. Penelitian menggunakan model pengembangan 4D. Subyek data validitas yaitu tiga orang validator (*expert judgement*) yaitu dua orang dosen dan dan orang guru mitra. Hasil penelitian menunjukan bahwa bahan ajar yang disusun memperoleh skor kesesuaian sebesar 4.45 dan asil uji kelayakan sebesar 4.35. Maka, rerata skor validitas 4.4 dengan kategori sangat valid. Materi pelajaran berbasis aplikasi android layak digunakan dalam proses pembelajaran dengan lebih fleksibel.

© 2023 BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan

A. Introduction

The Industrial Revolution 4.0 era brought many changes in many areas of life; the industrial world requires human resources (HR) who can adapt to the existing differences and challenges. This situation is a significant challenge for the educational world in terms of preparing quality human resources. Irianti et al. (2020) asserted that education 4.0 is education that incorporates technology into learning both directly and indirectly. Based on this, both educators and students must be able to follow the development of the industrial revolution, such as technological developments, in the era of industrial revolution 4.0 (Effendi & Wahidy, 2019). Learning to be flexible is done anytime and anywhere through the e-learning model that allows distance education, which is one of the steps in the education process 4.0 (Hussin, 2018).

Learning media makes learning more enjoyable, can increase learning motivation, and can diversify teaching methods. Learning media also assists students in preparing and receiving material when studying independently (Alhafidz & Haryono, 2018). A cell phone or smartphone is a technology-based learning media that is simple and convenient to use (Astuti et al., 2017). A smartphone is a mobile device that, like a computer, has an operating system that can run various forms of multimedia. A smartphone has the advantage of being highly portable and capable of being operated more efficiently. Today's smartphone operating systems are generally the Android™ operating system developed by Google™ and iOS which was initiated by the Apple™ computer company (Whildaini, 2017). Because students are frequently directly involved in learning activities, smartphone technology has the potential to provide new learning experiences (Kim et al., 2013).

Based on this, students require the development of learning media as teaching materials to facilitate the learning process. The learning media chosen to be developed as teaching materials are teaching materials based on Android applications, based on the availability of devices owned by students. Android application-based teaching materials are created as interactive teaching materials involving image display, audio, video, and navigation in information delivery. Android is an open-source operating system. With various types of application development, the Android operating system can produce representative learning media. With Android-based technology, learning will no longer be monotonous with just text but can include audio, visual, and even animation elements to help students understand the material. Android applications can make learning more exciting and motivate students to understand the material better (Sartono et al., 2022). Android tablets can help students understand the material better, and they have no negative impact on the teaching and learning process in the classroom (El-Mouelhy et al., 2013).

This study employs the 4D model (Define, Design, Develop, Disseminate) by Thiagarajan et al. (1974). This choice is because many similar studies use 4D models but with different concepts. In the define stage, a front-end analysis is carried out by analyzing teacher needs through interviews and filling out teacher needs analysis questionnaires. Based on the results of interviews and needs analysis questionnaires by biology teachers at MAN 2 Barito Kuala, the learning media commonly used in learning were only books, Google Classroom and Whatsapp groups. Given the current learning conditions that demand learning media that suit the needs of students, learning media such as interactive media based on Android applications are needed. The selection of android-based media is based on the results of student analysis at MAN 2 Barito Kuala, especially in class XII MIPA, who use smartphones with the Android platform. The next step is to analyze students' needs by filling out a questionnaire examining students' needs. Based on the student needs analysis questionnaire completed by 19 students in class XII MIPA at MAN 2 Barito Kuala, it is known that learning media based on android applications, other than Google Classroom and Whatsapp Group, have never been used. As many as 52.6% of students believe that interactive learning media based on android applications are necessary. Particularly in the sub-concept of Structure and Function of Plant Tissues, because this sub-concept contains complex material and many discussions are difficult to understand, necessitating a more in-depth explanation. Based on the above description, the researcher is interested in assessing the validity of high school teaching materials for the sub-concept of the structure and function of tissues in plants using the Android application.

B. Material and Method

The type of research employed in this study was research and development or also called Education Research and Development, with a 4D research model, according to Thiagarajan et al. (1974). Research location in MAN 2 Barito Kuala and Lambung Mangkurat University in the odd semester of 2021/2022 from September 2021 to

November 2021. The study's validity was done through a suitability and feasibility study of teaching materials.

The research subjects were divided into expert subjects and development trials. There were three expert subjects: two lecturers from the PMIPA Biology Education Study Program FKIP ULM Banjarmasin and one partner teacher teaching Biology class XII MIPA MAN 2 Barito Kuala. The research object in this research and development was learning materials on the sub-concept of tissue structure and function in plants based on android applications.

Data analysis to describe the feasibility of android application-based teaching materials on the sub-concept of the structure and function of plant tissue is calculated using the Formula 1 from Purwanto (2020).

$$M = \frac{\Sigma X}{N} \dots\dots\dots\dots\dots\dots\dots\dots \text{Formula 1}$$

Description:
M = average score of each aspect (mean)
ΣX = total score obtained
N = total aspects

The initial data scores were converted into qualitative data (interval data) with a Likert scale to determine the feasibility of the results of developing teaching materials based on android applications on the sub-concept of Tissue Structure and Function in Plants. The Likert scale has a maximum score of five and a minimum score of one. The feasibility study results are then categorized with the feasibility criteria for android application-based teaching materials in Table 1.

Table 1 Criteria for the validity of teaching materials based on android applications

No	Score average	Criteria
1	X > 4,20	Very feasible
2	3,40 < X ≤ 4,20	Feasible
3	2,60 < X ≤ 3,40	Fairly feasible
4	1,80 < X ≤ 2,60	Less feasible
5	X ≤ 1,80	Very inadequate

C. Results and Discussion

Potential problems, data collection, product design, and product revision design validation are among the Android application-based teaching materials developed. Validation was performed by three experts, including two Plant Physiology course tutors and one partner teacher, and the results are shown in Tables 2 and 3.

One of the chapters taught in class XI SMA in odd semesters is the Sub Concept of Tissue Structure and Function in Plants. This concept introduces the Types of Plant Tissues, the Structure and Function of Plant Tissues, Tissues in Plant Organs and Totipotent Properties, and Tissue Culture (Kemendikbud, 2016). The development of teaching materials based on android applications is based on problems identified by analysis activities among teachers and students regarding the use of teaching materials during the learning process.

Table 2 Summary of conformity results

No.	Aspects	Score Average
1.	The relevance of learning objectives set according to basic competence	4,67
2.	Learning objectives are meaningful to teachers	4,33
3.	Learning objectives are meaningful to learners	4,33
4.	The source of the learning objectives derived is clear	5,00
5.	Learning objectives come from other sources	4,67
6.	Relevance of content in accordance with learning objectives	4,33
7.	The theoretical content is presented in full	4,67
8.	Definitions and explanations are presented in detail complete	4,33
9.	The use of terms, techniques, formulas, and endids is presented in full	4,00
10.	Examples are presented in teaching materials based on android applications	4,67
11.	The examples presented are in accordance with everyday life	4,67
12.	The author's ability to develop teaching materials based on Android applications	4,00
13.	Compatibility of sentences with Indonesian EYD rules	4,00
14.	Compatibility of the image with the material	4,67
	Total Score	**62,34**
	Conformity Score Results	**4,45**
	Average Conformity Score	**4,45**
	Conclusion	**Very Feasible**

Table 3 Summary of feasibility results

No.	Aspects	Score Average
1.	Teaching materials are arranged in a complete way	4,67
2.	Availability of additional material in accordance with the concept	4,33
3.	Teaching materials can be used repeatedly	5,00
4.	Requirements available (Instructions for use, KI Identity, KD, and GPA)	4,67
5.	The scope of learning materials is available	4,00
6.	Allocation of time for the use of teaching materials is available	4,00
7.	Teaching materials can be used independently	4,67
8.	Meeting scheduling is available in Teaching materials	3,67
9.	Cost of production of teaching materials	4,00
10.	Procedure for using teaching materials	4,00
11.	Ease of use of teaching materials	4,67
12.	Special knowledge is required in the use of teaching materials	4,00
13.	The possibility of receiving teaching materials by students	4,33
14.	Possible acceptance of teaching materials by teachers	4,33
15.	Selected font type and size	4,33
16.	Ease of reading text/writing	4,67
17.	Color selection	4,67
18.	The layout of the image is appropriate and easy to observe	4,33
19.	The attractiveness of the initial view	4,33
20.	Clarity of instructions for use.	4,33
	Total Score	**87**
	Feasibility Score Results	**4,35**
	Average Feasibility Score	**4,35**
	Conclusion	**Very Feasible**

Experts test and evaluate the validity of teaching materials using conformity and feasibility tests. A suitability test was used to assess the suitability of the sub-concept teaching materials for the Structure and Function of Plant Tissues based on the Android application. A suitability questionnaire was used to conduct the suitability test. The suitability test, according to Thiagarajan et al. (1974), helps determine the suitability of learning resources developed with the learning objectives that students must achieve. The suitability instrument included several assessment aspects such as learning objectives, content, examples, and the author's ability to create teaching materials based on android applications.

After being evaluated by three experts, the developed android application-based teaching materials received an average suitability score of 4.45. This score indicates that the developed android application-based teaching materials met the learning objectives based on the curriculum demands outlined in the Revised 2013 Curriculum Syllabus at Man 2 Barito Kuala. The suitability of the material presented follows the essential competencies, achievement of competencies, and learning objectives, and vice versa. If the material is prepared without referring to these three things, it will keep away from achieving optimal learning outcomes (Susanto, 2014).

This android application-based teaching material is thought to be very appropriate because its preparation has been adapted to core competencies, essential competencies, competency achievement indicators, and learning objectives based on the needs of teachers and students so that the source aspect of the derived learning objectives receives the highest points, i.e. 5.00. It is clear from these derivatives that the learning objectives are derived from the Competency Achievement Indicator (GPA).

The aspect that received the second highest point, namely 4.67, was the relevance of learning objectives set according to essential competencies, knowledge goals come from other sources, theoretical content is presented in full, examples are presented in teaching materials, examples are presented following everyday life, and the suitability of the image with the material. These findings indicate that the content relevance of the developed android application-based teaching materials was consistent with the learning objectives and essential competencies. This met the criteria for selecting teaching materials proposed by Qodriyah (2019), namely that learning materials must have a relationship with the achievement of competency standards and essential competencies so that they are in accordance with learning objectives.

According to Khusna (2018), teaching material is essentially the content of the subjects assigned to students based on the curriculum. Teaching materials must be appropriate and capable of supporting the achievement of learning objectives; they must be in the form of an outline only, not in detail; they must be compatible with the sequence of learning objectives; and they must pay attention to continuity. The Android application-based teaching materials developed are also thought to have complete theoretical content as well as an evaluation. According to Pangestika et al. (2013), a learning presentation can be optimal if the competency standards, essential competencies, completeness of material selection, examples of applying concepts, evaluation tools, and feedback on the success of learning that has been implemented are all appropriate.

According to Idrus (2019), evaluation is a measuring tool or process used to determine the level of achievement that students have achieved on the material that has been delivered so that the objectives of learning can be seen accurately and convincingly. As a result, the completeness of the material presented is critical in education, and evaluation tools are an essential component of teaching and learning activities.

Based on the linguistic aspect, the developed android application-based teaching materials are evaluated using simple language. This is, of course, very beneficial for students in understanding the sub-concept of Structure and Function of Plant Tissues using teaching materials based on developed android applications. This finding is supported by Kurniawan et al. (2016), who state that good writing in accordance with standard rules is hoped to prevent students from having misconceptions.

Android application-based teaching materials also include a glossary and a bibliography. These components are highly beneficial to the development of teaching materials, particularly the glossary component, which assists students in understanding the sub-concept of Plant Tissue Structure and Function. The glossary aims to help students understand unfamiliar terms and contains important terms and biological concepts (Ummah & Wisanti, 2021).

Some of the aspects that received the lowest points, namely 4.00, include aspects of a full presentation of terms, techniques, formulas, and symbols; aspects of the author's ability to develop teaching materials based on android applications; and suitability of sentences with Indonesian EYD rules. These findings suggested that there was room for improvement in the suitability of sentences in teaching materials for Indonesian EYD rules, as well as a need for writers to improve their skills in developing teaching materials. This teaching material did not present too many terms, techniques, formulas, or symbols because the sub-concepts studied in this teaching material do not contain many terms, techniques, formulas, or symbols in the discussion.

According to Thiagarajan et al. (1974), the feasibility test is useful for determining which learning resources developed can be used by students in learning. Primandiri et al. (2016) also stated that learning resources are generally important for conducting a feasibility assessment because the quality of the learning resources that will be used in the learning process can be seen from this assessment. The developed android application-based teaching materials received an average feasibility score of 4.35 after being evaluated by three experts. This rating indicates that the developed Android application-based teaching materials were technically feasible for use as teaching materials.

The feasibility instrument included 20 assessment aspects such as teaching material packaging, availability of additional materials, reusable teaching materials, teaching material requirements, the scope of learning materials, time allocation, teaching materials that can be used independently, meeting schedules, production costs, guidelines use, ease and simplicity of using teaching materials, and acceptance by teachers and students.

The developed teaching materials were deemed very feasible because they met all aspects of the feasibility assessment. The aspect that received the highest score was that teaching materials based on android applications were thought to be used repeatedly. This means that teaching materials based on android applications were adaptable and could be used whenever and wherever students were ready and willing, allowing students to repeat material independently without being constrained by time and place.

The material presented in teaching materials based on developed android applications can be automatically embedded in students' memories. Ginting et al. (2021) stated that teaching materials that can be used repeatedly make it easy to learn anywhere and at any time, making it more flexible and fun because it can be accessed using a smartphone. The more frequently students repeat the material, the better they will understand what has been delivered. Lubis & Ikhsan (2015) also stated that using or learning that is repeated

frequently can improve student learning achievement.

Second, requirements such as usage guidelines, Core Competencies (KI), Basic Competencies (KD), Competency Achievement Indicators (GPA), and learning objectives are considered to be available in teaching materials based on android applications. The Android application-based teaching materials that have been developed include detailed guidelines for use and competencies that students must achieve. According to Aisyah et al. (2020), as an evaluation tool, the teaching materials delivered must be in accordance with the education and competencies that students will achieve according to the applicable curriculum.

Third, this Android-based teaching material was simple to use. This was because simple navigation buttons were available. According to Aziza (2021), the functionality of its elements, such as navigation features and instructions for use, can indicate ease of access. The availability of usage guides can help students understand what they need to do when using teaching materials based on developed android applications.

To produce products that are suitable for use in learning, it is still necessary to revise teaching materials based on Android applications based on expert suggestions. Several revisions were made, including adding the scope of learning to the product, scheduling meetings, determining learning objectives to be achieved at each meeting, adding videos and explanations, changing the colour of the writing, completing instructions for use, and adjusting the size of the writing. The aspect of meeting scheduling available in teaching materials received the lowest point, 3.67, because it was not previously included, but improvements to the meeting schedule have been added.

Based on the data analysis above, the validity of the developed teaching materials can be seen from the suitability data, which was equal to 4.45, and the feasibility score was 4.35, resulting in an average score of 4.4 with very valid criteria for the developed android application-based teaching materials.

D. Conclusion

Based on the findings of the research and data analysis, this study concludes that teaching materials of the sub-concept of structure and function of tissues in plants in high school obtained a suitability score of 4.45, and the result of the due diligence test was 4.35. This result means that the category with a validity score of 4.4 was very valid. The valid android application-based teaching material is feasible in the learning process with more flexibility but still needs further testing regarding its practicality and effectiveness.

E. References

Aisyah, S., Noviyanti, E., & Triyanto, T. (2020). Bahan ajar sebagai bagian dalam kajian problematika pembelajaran bahasa Indonesia. *Jurnal Salaka: Jurnal Bahasa, Sastra, dan Budaya Indonesia, 2*(1), 62-65. DOI: https://doi.org/10.33751/jsalaka.v2i1.1838

Alhafidz, M. R. L., & Haryono, A. (2018). Pengembangan mobile learning berbasis android sebagai media pembelajaran ekonomi. *Jurnal Pendidikan Ekonomi, 11*(2), 118-124. Retrieved from http://journal2.um.ac.id/index.php/jpe/article/view/3450

Astuti, I. A. D., Sumarni, R. A., & Saraswati, D. L. (2017). Pengembangan media pembelajaran fisika mobile learning berbasis android. *Jurnal Penelitian & Pengembangan Pendidikan Fisika, 3*(1), 57-62. DOI: https://doi.org/10.21009/1.03108

Aziza, A. S. (2021). Pengembangan bahan ajar konsep sistem peredaran darah manusia biologi sma dalam bentuk booklet digital. *BIOMA: Jurnal Biologi dan Pembelajarannya, 3*(2), 13-30. DOI: https://doi.org/10.31605/bioma.v3i2.1246

Effendi, D., & Wahidy, A. (2019, July). Pemanfaatan teknologi dalam proses pembelajaran menuju pembelajaran abad 21. In *Prosiding Seminar Nasional Program Pascasarjana Universitas PGRI Palembang*. Retrieved from https://jurnal.univpgripalembang.ac.id/index.php/Prosidingpps/article/view/2977/2799

El-Mouelhy, I., Poon, I. H., Hui, A. N. N., & Sue-Chan, C. (2013). Does a creative learning medium matter? Impact of low cost android tablets on elementary students' English comprehension, perceived performance and memory retention. *Creative Education, 4*(12B), 42-50. DOI: http://dx.doi.org/10.4236/ce.2013.412A2007

Ginting, D., Fitri, D. I., Mulyani, Y. S., Ismiyani, N., & Sabudu, D. (2021). *Inovasi pengajaran dan pembelajaran melalui platform digital teori dan praktik pengoperasian*. Malang: Media Nusa Creative (MNC Publishing).

Hussin, A. A. (2018). Education 4.0 made simple: Ideas for teaching. *International Journal of Education and Literacy Studies, 6*(3), 92-98. DOI: https://doi.org/10.7575/aiac.ijels.v.6n.3p.92

Idrus, L. (2019). Evaluasi dalam proses pembelajaran. *Adaara: Jurnal Manajemen Pendidikan Islam, 9*(2), 920-935. DOI: http://dx.doi.org/10.35673/ajmpi.v9i2.427

Irianti, R., Dharmono, D., & Mahrudin, M. (2020, February). Development of Biology Learning Media Based on Macromedia Flash in the Era of Industrial Revolution 4.0. In *International Conference on Educational Research and Innovation (ICERI 2019)* (pp. 57-60). Atlantis Press. DOI: https://doi.org/10.2991/assehr.k.200204.011

Kemendikbud. (2016). *Silabus Biologi SMA/MA Kurikulum 2013 Revisi*. Jakarta. Kementerian Pendidikan dan Kebudayaan

Khusna, I. L. (2018). *Kesesuaian tujuan dan materi pembelajaran pada rencana pelaksanaan pembelajaran terhadap pelaksanaan pembelajaran sastra kelas XII SMK Batik 2 Surakarta* (Doctoral dissertation, Universitas Muhammadiyah Surakarta). Retrieved from http://eprints.ums.ac.id/65333/

Kim, D., Rueckert, D., Kim, D. J., & Seo, D. (2013). Students' perceptions and experiences of mobile learning. *Language Learning & Technology, 17*(3), 52-73. Retrieved from https://www.learntechlib.org/p/154094/

Kurniawan, M. R. (2017). Analisis karakter media pembelajaran berdasarkan gaya belajar peserta didik. *JINoP: Jurnal Inovasi Pembelajaran*, *3*(1), 491-506. DOI: https://doi.org/10.22219/jinop.v3i1.4319

Lubis, I. R., & Ikhsan, J. (2015). Pengembangan media pembelajaran kimia berbasis android untuk meningkatkan motivasi belajar dan prestasi kognitif peserta didik SMA. *Jurnal Inovasi Pendidikan IPA, 1*(2), 191-201. DOI: http://dx.doi.org/10.21831/jipi.v1i2.7504

Pangestika, M. W., Suyanto, E., & Viyanti. (2013*). Pengembangan Lembar Kerja Siswa (LKS) Berbasis Keterampilan Proses Sains (KPS) pada Kompetensi Dasar Menyelidiki Sifat–Sifat Zat Berdasarkan Wujudnya dan Penerapannya dalam Kehidupan Sehari-hari.* (Skripsi, Universitas Lampung). Retrieved from http://digilib.unila.ac.id/id/eprint/5570.

Prastowo, A. (2011). Panduan kreatif membuat bahan ajar inovatif. Yogyakarta: Diva Press.

Primandiri, P. R., Amin, M., Zubaidah, S., & Maftuchah, M. (2016, May). Profil bahan ajar genetika yang digunakan di Program Studi Pendidikan Biologi Universitas Nusantara PGRI Kediri. In *Prosiding SNPBS (Seminar Nasional Pendidikan Biologi dan Saintek)* (pp. 905-909). Retrieved from https://proceedings.ums.ac.id/index.php/snpbs/article/view/643

Purwanto, M. N. (2020). *Prinsip-prinsip dan teknik evaluasi pengajaran.* Bandung: PT Remaja Rosdakarya.

Qodriyah, L. (2019). *Kelayakan bahan ajar pada rancangan pelaksanaan pembelajaran bahasa Indonesia Kurikulum 2013 yang disusun oleh pendidik SMA kelas XI di Kabupaten Demak*. (Skripsi, Universitas Negeri Semarang). Retrieved from https://lib.unnes.ac.id/33748/

Sartono, E., Sekarwangi, T., & Herwin, H. (2022). Interactive multimedia based on cultural diversity to improve the understanding of civic concepts and learning motivation. *World Journal on Educational Technology: Current Issues, 14*(2), 356-368. DOI: https://doi.org/10.18844/wjet.v14i2.6909

Susanto, A. (2014). *Pengembangan pembelajaran IPS di SD*. Jakarta: Kencana.

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *instructional development for training teachers of exceptional children: A sourcebook.* Indiana: Indiana University.

Ummah, L., & Wisanti, W. (2021). Kelayakan buku pengenalan "Keanekaragaman paku-pakuan" sebagai sumber belajar. *Berkala Ilmiah Pendidikan Biologi (BioEdu), 10*(2), 257-266. DOI: https://doi.org/10.26740/bioedu.v10n2.p257-266

Whildaini, A. M. (2017). *Rancang bangun pembelajaran bahaya merokok berbasis android* (Doctoral dissertation, Universitas 17 Agustus 1945 Surabaya). Retrieved from repository.untag-sby.ac.id/499/