



Development of Pop-up Teaching Materials Excretion Systems for Junior High School Students

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Abstract: This study aims to develop pop-up teaching materials for an excretion system material for junior high school students. This research is development research using a 4-D model, which includes four stages: Define, Design, Develop, and Disseminate. Teaching material products are then validated and tested on a limited basis to see the practicality of teaching materials. The pop-up teaching materials developed have met the valid criteria, which have been carried out through media expert validation, content validation, and subject teachers. The validation results show that teaching materials are in the excellent category. In addition, the teaching materials have also fulfilled a series of limited trials on students, indicating that the teaching materials meet practical criteria. In general, the pop-up teaching materials that have been developed are well received by teachers and students. Pop-up teaching materials can increase motivation and student learning outcomes and are suitable for use as science learning materials for junior high school students, especially in excretion system material.

Artikel History

Received : March 25, 2023

Accepted : April 16, 2023

Published : April 30, 2023

Key Words

Pop-up Teaching
Materials, Excretion
System

How to Cite: Nuraini, Z., & Ekaningtias, M. (2023). Development of Pop-up Teaching Materials Excretion Systems for Junior High School Students. *DIDAKTIKA : Jurnal Penelitian Tindakan Kelas*, 1(1), 13–18.

DOI: <https://doi.org/10.xxxx/djptk.vvxyyi>

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INTRODUCTION

Natural Sciences is a science that studies all forms of life and natural phenomena on this earth collected in three fields of science: biology, physics, and chemistry. Natural Science studies living things (Nurhapsari et al, 2016; Panggabean et al, 2021; Sutrisna & Gusnidar, 2022). One of the materials studied in science subjects is the excretory system (Luzyawati & Hidayah, 2019). Excretion is needed by the body so that the waste products of metabolism do not poison the body because they can damage various organs and even cause death. The human excretory system involves several excretory organs: kidneys, skin, lungs, and liver.

The excretory system is one of the essential materials to be learned by students. The excretory system is a biological concept that studies the processes of removing metabolic wastes in the body (Aprilanti et al., 2016). The excretory system discusses the structure of the excretory organs, mechanisms, and functional disorders of the excretory system. Excretory system material is classified as difficult for students to understand because it is abstract and complicated; many foreign terms are difficult to understand, so students are less motivated to learn (Rahmayani et al., 2017).

Based on observations of science learning and interviews with science teachers at MTs NW Montong Baan, Sikur, and East Lombok, it is known that the learning resources teachers use in learning science are limited to the textbooks provided by the school. Meanwhile, other learning resources that are more varied and interesting for students are needed, especially in learning excretion material. This is because the material for the excretory system is abstract, so media is needed that can display material with relevant images and motivate students to learn. One of the learning media that can be developed as teaching material for excretory system subjects is pop-up books (Nisa et al., 2018; Septiana et al., 2021). Pop-up books are teaching materials developed so students can study independently without or with teacher guidance (Fadillah & Lestari, 2016). The advantage of pop-up books is that they always provide surprises on each page, which can provoke the reader's enthusiasm to open the next page (Lismayanti et al., 2016). In addition, pop-up books can develop students' critical and creative thinking skills, and the images presented can make students enthusiastic about learning (Nugroho & Nugroho, 2016). This study aims to develop pop-up excretion material for junior high school students.

RESEARCH METHODS

This research is development research. The development model used is the 4-D Thiagarajan model (Kurniawan & Dewi, 2017), which consists of four stages: define, design, develop, and disseminate. At the define stage, curriculum analysis and student analysis were carried out. At the design stage, the preparation of references related to excretion system material is carried out; as preparation of pop-up display design teaching materials; and preparation of assessment instruments for pop-up teaching materials. At the development stage, an expert validation test was carried out, including the validation of media experts, material experts and subject teachers (Rahmatilah et al., 2017; Rosalina & Nugrahani, 2019). The dissemination stage is the last stage of the research. At this stage, a readability test of teaching materials was carried out with ten students at MTs NW Montong Baan in class VIII. The research instrument was a questionnaire, namely an expert validation questionnaire and a readability test questionnaire for students (Ashri & Hasanah, 2016). Scores in the questionnaire used a Likert scale from 1 to 5 with categories 1 = not good, 2 = not good, 3 = good enough, 4 = good and 5 = very good (Nabila et al., 2021). The data in the form of a scale is then presented in percentages and converted into five criteria, as shown in Table 1.

Table 1. Scores of teaching material validation instruments

Achievement Percentage	Criteria
81%-100%	Very good
61%-80%	Good
41%-60%	Pretty good
21%-40%	Not god
0%-20%	Very not good

RESULTS AND DISCUSSION

An analysis of the curriculum and students is carried out at the defined stage. The results show that the teacher only has one textbook used in science learning, while there are no other teaching materials to complement the school's textbooks. The results of the needs analysis on students also strengthen these findings. Students need teaching materials that are diverse, more interesting and not boring. Based on these results, the development of pop-up teaching materials needs to be done. The next stage is designing. At this stage, the design of teaching materials includes cover design, table of contents, competency standards and indicators, excretory system material, practice questions, and lists of references. The results of designing teaching materials are shown in Figure 1.



Figure 1. Display of excretory system pop-up teaching materials

On the cover of the pop-up book is a title and a picture of the organs of the human excretory system, and in the lower right corner, it shows the book's target, namely for class VIII. The table contains the order and numbering of the contents listed in the pop-up book, making it easier for students to find the pages they want to read. Competency standards and indicators are an important part that must be included in the book because they are a reference for preparing material so that learning objectives can be achieved properly. Excretory system material contains an explanation of the organs of the human excretory system, parts of the organs, organ functions, and diseases caused by damage to these organs. The practice questions consist of multiple choices. The practice questions evaluate students' understanding of the material of the human excretory system. Lastly is the bibliography, which contains the sequence of references used to prepare the excretory system material in the pop-up book.

After designing, the next stage is development. The development of pop-up teaching materials is validated by experts, including learning media experts, content experts, and subject teachers. A summary of the validation results by experts is shown in Table 2.

Table 2. Results of expert validation of teaching materials

Validator	Percentage	Criteria
Media Expert	90%	Very good
Material Expert	96,6%	Very good
Subject teachers	89,33%	Very good

Media expert validation aims to determine the suitability of the design appearance developed on teaching materials. The validation results show that pop-up teaching materials are interesting and stimulate students' curiosity about the excretory system material. The purpose of content validation is to determine the suitability of the contents of the pop-up book material to the needs of students. The results of the content validation show that the pop-up book material is very good for Grade VIII students. Validation by subject teachers is an important part of assessing the feasibility of products developed to determine the practicality of teaching materials in the learning process. The validation results by subject teachers show that pop-up teaching materials are very well used in the learning process.

At the dissemination stage, a reading test was carried out at MTs NW Montong Baan in class VIII with ten students. The results of the readability test of teaching materials are shown in Figure 2. Figure 2 shows that the results of the practicality assessment of teaching materials by students obtained the lowest score of 92.72%, the highest score of 96.36% and an average of 94.72% in the very practical category. According to students, the appearance of pop-up books is interesting because some parts of the book can be moved and have a two or three-dimensional view. This is in accordance with what was stated by Permadi et al. (2020) that pop-up books have three-dimensional elements and provide an interesting story visualization. Apart from being interesting, students also thought that pop-up books increased their enthusiasm for learning. This is because students can use pop-up books independently or in groups.

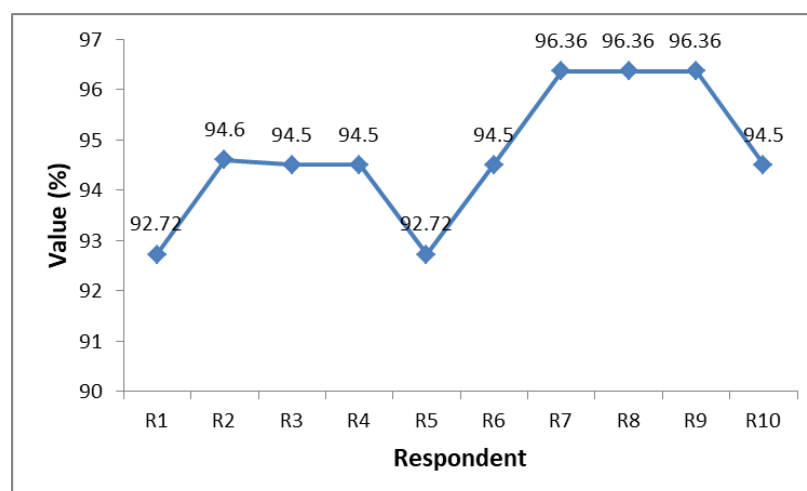


Figure 2. Test the legibility of teaching materials on students (n = 10)

The readability analysis results show that the developed pop-up book can attract students' interest in learning, especially for students who don't like to read. This is because pop-up books can provide benefits, including (a) teaching children to respect books and taking good care of them, (b) bringing children closer to parents because pop-ups provide an opportunity for parents to accompany children when using them, (c) develop creativity children, (d) stimulate children's imagination, (e) increase knowledge and provide shape recognition to objects, and (f) can be used as a medium to foster interest in reading in children (Dzuanda, 2009; Elwarak et al., 2018; Putri et al., 2019). Apart from that, according to the science teacher at MTs NW Montong Baan, this pop-up book also has advantages, which can increase students' knowledge and learning outcomes on excretory system material. The teacher also believes that this book can stimulate students' intelligence. This is in accordance with the findings of Hanifah (2014), who argues that the use of pop-up books significantly increases verbal-linguistic intelligence in children. In general, pop-up books that have been developed are well received by teachers and students and can motivate students in learning and improve student learning outcomes.

CONCLUSION

The pop-up teaching materials developed have met the valid criteria, which have been carried out through media expert validation, content validation, and subject teachers. The results of the validation show that teaching materials are in the very good category. In addition, the teaching materials have also fulfilled a series of limited trials on students, showing that the teaching materials meet practical criteria. In general, the pop-up teaching materials that have been developed are well received by teachers and students, can increase motivation and student learning outcomes and are suitable for use as science learning materials for junior high school students, especially in excretion system material.

REFERENCES

- Aprilanti, H., Qurbaniah, M., & Muldayanti, N. D. (2016). Identifikasi miskonsepsi siswa pada materi sistem ekskresi manusia kelas xi Mia SMA negeri 4 pontianak. *Jurnal Bioeducation*, 3(2), 63-77.
- Ashri, N., & Hasanah, L. (2016). Uji Keterpahaman dan Kelayakan Bahan Ajar IPA Terpadu. *Edusains*, 8(2), 145-149.
- Dzuanda, B. (2009). Perancangan Buku Cerita Anak Pop Up, Tokoh-Tokoh Wayang Berseri, Seri "Gatotkaca"(Tugas Akhir). Surabaya: *Institut Teknologi Sepuluh Nopember Surabaya*.
- Elwarak, R., Dini Faisal, S. D., Ds, M., San Ahdi, S. S., & Ds, M. (2018). Perancangan Buku Pop-Up Mengenai Manfaat Buah dan Sayur Untuk Anak-anak. *DEKAVE: Jurnal Desain Komunikasi Visual*, 8(1).
- Fadillah, R. N., & Lestari, I. (2016). Buku pop-up untuk pembelajaran bercerita siswa sekolah dasar. *PERSPEKTIF Ilmu Pendidikan*, 30(1), 21-26.
- Hanifah, T. U. (2014). Pemanfaatan media pop-up book berbasis tematik untuk meningkatkan kecerdasan verbal-linguistik anak usia 4-5 tahun (studi eksperimen di TK

- negeri pembina bulu temanggung). *BELIA: Early Childhood Education Papers*, 3(2), 46-54.
- Kurniawan, D., & Dewi, S. V. (2017). Pengembangan perangkat pembelajaran dengan media screencast-o-matic mata kuliah kalkulus 2 menggunakan model 4-D Thiagarajan. *Jurnal Siliwangi: Seri Pendidikan*, 3(1).
- Lismayanti, M., Hamidah, A., & Anggereini, E. (2016). Pengembangan Buku Pop Up Sebagai Media Pembelajaran Pada Materi Crustacea Untuk SMA Kelas X. *Jurnal Penelitian Universitas Jambi: Seri Humaniora*, 18(1), 44-48.
- Luzyawati, L., & Hidayah, H. (2019). Profil miskonsepsi siswa dalam materi sistem ekskresi melalui penugasan peta konsep. *Jurnal Mangifera Edu*, 3(2), 72-87.
- Nabila, S., Adha, I., & Febriandi, R. (2021). Pengembangan Media Pembelajaran Pop Up Book Berbasis Kearifan Lokal pada Pembelajaran Tematik di Sekolah Dasar. *Jurnal Basicedu*, 5(5), 3928-3939.
- Nisa, L., Wuryandani, W., & Masradiani, M. (2018). Perancangan Buku cerita pop-up berbasis karakter untuk menanamkan karakter peduli sosial anak usia dini. *Proceedings of the ICECRS*, 1(3), v1i3-1366.
- Nugroho, S., & Nugroho, N. (2016). Peningkatan keaktifan dan hasil belajar siswa melalui penerapan teori konstruktivisme berbasis media wondershare quizcreator. *Indonesian Journal of Curriculum and Educational Technology Studies*, 4(2), 73-78.
- Nurhapsari, R., Sutarto, S., & Mahardika, I. K. (2016). Pengembangan Model Pembelajaran PDC (Preparing, Doing, Concluding) untuk Pembelajaran IPA. *Jurnal Pembelajaran dan Pendidikan Sains*, 1(1), 9-16.
- Panggabean, F., Simanjuntak, M. P., Florenza, M., Sinaga, L., & Rahmadani, S. (2021). Analisis peran media video pembelajaran dalam meningkatkan hasil belajar ipa smp. *JPPIPAI: Jurnal Pendidikan Pembelajaran Ilmu Pengetahuan Alam Indonesia*, 1(2).
- Permadi, D., Ma'ruf, M. I., & Wijayanti, J. A. (2020). Rancangan Pop-up Book Freight Forwarding Sebagai Media Pembelajaran Mandiri. *Jurnal Logistik Bisnis*, 10(1), 56-60.
- Putri, Q. K., Pratjojo, P., & Wijayanti, A. (2019). Pengembangan media buku Pop-Up untuk meningkatkan kemampuan menyimak tema menyayangi tumbuhan dan hewan di sekitar. *Jurnal Pedagogi Dan Pembelajaran*, 2(2), 169-175.
- Rahmatilah, S., Hidayat, S., & Apriliya, S. (2017). Media Buku Pop Up Untuk Pembelajaran Bahasa Indonesia Di Kelas Rendah. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, 4(1), 139-148.
- Rahmayani, R., Sinambela, M., & Rosida, R. 2017. Analisis faktor kesulitan belajar siswa pada materi pokok sistem ekskresi manusia kelas XI MIA SMA Negeri 16 Medan. *Jurnal Pelita Pendidikan*, 5(2).55-65.
- Rosalina, C. D., & Nugrahani, R. (2019). Pengembangan Media Buku Pop-Up Untuk Pembelajaran Mengenal Huruf Alphabet Anak Usia Dini. *Seling: Jurnal Program Studi PGRA*, 5(1), 54-63.
- Septiana, A. W., Natalina, M., & Darmadi, D. 2021. Pengembangan media pop up book berbasis literasi sains pada materi sistem ekskresi siswa kelas VIII SMP. *Jurnal Online Mahasiswa (JOM) Bidang Keguruan dan Ilmu Pendidikan*, 8(1), 1-9

- Simorangkir, A., Napitupulu, M. A., & Sinaga, T. (2020). Analisis kesulitan belajar siswa pada materi sistem ekskresi manusia. *Jurnal Pelita Pendidikan*, 8(1), 1-11.
- Sutrisna, N., & Gusnidar, G. (2022). Pengembangan Buku Siswa Berbasis Inkuiri Pada Materi IPA Untuk Siswa Kelas VIII SMP. *Jurnal Inovasi Penelitian*, 2(8), 2859-2868.