Ilkogretim Online - Elementary Education Online, 2021; 20 (1): pp. 1205-1214
http://ilkogretim-online.org
doi: 10.17051/ilkonline.2021.01.109

Developing picture storybook in the human excretory system concepts for improving students' interests science learning

Ruqiah Ganda Putri Panjaitan, *Tanjungpura University, Indonesia, ruqiah.gpp@fkip.untan.ac.id , ORCID: 0000-0002-2194-8808*
Galih Albarra Shidiq, *Kasetsart University Thailand, galihalbarrashidiq.s@ku.th , ORCID: 0000-0002-4889-5419*
Wulan Muhar Pratiwi, *Tanjungpura University, Indonesia, wulanmuharpratiwi@gmail.com, ORCID: 0000-0003-2918-6331*
Yokhebed, *Tanjungpura University, Indonesia, yokhebed@fkip.untan.ac.id ,ORCID: 0000-0001-9517-4393*

Abstract. The purpose of this study was to investigate students' responses to the picture storybook as a part of the teaching material which can facilitate students' thinking. This study involved the seven steps: the introduction, planning, and development of the initial product, initial field trial, revision on the main product, field trial, and revision on the operational product. The field trial was conducted to determine students' responses to the dimension of cognitive, affective, and conative aspects through exploring three secondary schools around Pontianak, Indonesia. The results of the initial field trial showed the cognitive aspects (84.57%); the affective aspects (89.38%); and the conative aspects (89.46%). The implication of this research was about the possibility to use a picture storybook for increasing students' interests in science learning that we examined by the subject categories.

Keywords: Development application, picture storybook, human excretory system, science learning

Received: 17.11.2020	Accepted: 02.12.2020	Published: 06.01.2021

INTRODUCTION

The current shortage of teaching material in the field of science education is not facilitating students' thinking (Bingimlas, 2009). The young generation has grown up with new technology through various types of devices such as tablet computers and cellphones. These are portable devices that students can access every time and at any time by giving students' motivation to learn (Tileston, 2003). Using a media in learning can be a way to help students in learning by constructing their knowledge in learning science through exploring the various aspects i.e. learning with technologies, understanding symbolic systems in media, and processing their knowledge capabilities (Kozma, 1991). However, in the action of current teaching practices, teachers were still finding the ways to teach students by using the variations and innovations of teaching methods based on their knowledge, and experiences (Van Driel et al., 2001; Noviyanti, 2016; Shidiq & Faikhamta, 2020).

In a review of Indonesian Government policy focused on developing preparation and quality of education by providing the freedom for the teachers to uses many kinds of teaching approaches (Ministry of Education Indonesia, 2013). For instance, reading is one of the important methods to promote students' interest in learning. Reading is an easily approachable training method that can be used to attain and gather information, enrich the experience, and expand insights (Wahyuni, 2010; Retariandalas, 2017). However, based on the UNESCO survey the interest rate of reading in Indonesian people was very low, at 0.0001 (Pratiwi & Sudibyo, 2018). This was believed due to the resources books that are not attractively presented for students. Also, Damopolii and Nunaki (2016) demonstrated that the available current textbooks do not look eye-catching which makes students less attractive to read. Moreover, the size of the textbooks is relatively big enough with a long-displaying context; less colorful pictures also slightly contribute as the main cause of low rate in reading in students (Ami et al., 2012).

Most of the research argued that picture storybook is a book which contains a plot of stories with pictures displayed (Faizah, 2009; Afnida et al., 2016; Mustari & Sari, 2017). The picture storybook is grouped in learning tools that perhaps can stimulate students to study more (Embun & Astuti, 2015). Generally, the learning tool simply helps the teacher to explain more the messages from the teachings (Primasari et al., 2014), but good communication from teachers in transferring lessons is favorably essential in order to shape a virtuous learning process (Nuryanti, 2016). The results obtained by Adipta et al. (2016); Faizah (2009) explained that using picture storybook is potentially increasing the interest

and activities of students, as well their interests in reading (Afnida et al., 2016), even more producing their affection of reading (Faizah, 2009).

These researches concluded one of the hardest subjects to understand is natural sciences. As noted in the modules of the natural sciences is completely abstractive (Insani, 2016) and contextual (Isnaningsih & Bimo, 2013). One of the modules in Biology, where one of its chapters is the excretion system in human. According to the 2013 National curriculum, the content of excretion system in human learnt in grade 8 covers in Basic Competency 3.10 in studying excretion system in human and identifying the interferes in the system as well as the efforts to preserve the health of the system; and basic competency 4.10 in creating artworks related to the excretion system in human and the applications of maintaining the personal health. Some scientists pointed out that modules in the excretion system are completely abstractive and complex, so it is desirable a tool that can visualize the excretion process and enable students to understand the modules well. Some studies showed various tools that have been well-developed to learn the chapter, including a handbook (Ami et al., 2012), web and electronic learning-based methods (Daud & Rahmadana, 2015), augmented reality-version android (Qumillaila et al., 2017) and flash-based interactive approaches (Ambarwati & Wibowo, 2018). The established learning approaches have acquired some positive responses and triggered the interest in students from spending them while studying.

Connected to the development of learning tools, there are some influence able aspects that are useful to measure the eligibility of them, such as format, language, and content (Ami et al., 2012; Purwanto & Yuliani, 2013; Panjaitan et al., 2016; Astuti et al., 2016; Hilyana, 2017). Not only but the response from students is also applicable to measure the compatibility of the tools. According to Hidayati and Muhammad (2013), the response is a measurable reaction produced by somebody in analyzing an object that can generate an attitude. In studying, the response is linked to the stimulus, where it is simply a reaction or impulse against the designated stimulus (Nahar, 2016). The response is usually shown with a positive or negative impact (Kusuma & Aisyah, 2012; Hidayati & Muhammad, 2013; Sari et al., 2018). Tahki (2014) classified response in three types: 1) cognitive response (a convinced statement); 2) affective response (an affection statement); and 3) conative response (a behavior statement). Moreover, Dachimiati (2015) demonstrated that cognitive elements are associated with the information and perception of confidence level; affective elements are related to emotions such as happiness and unhappiness, and conative elements are contributed to objective behaviors.

To access the limited research and discussion, it is necessarily developed the picture storybook through a module in the Human Excretion System as a learning material for students to expose and facilitate their thinking. Apart of containing the chapter, the book is also applicable informative with regard to cystitis or urinary tract infection (UTI) (inflammation of the bladder) incidences from January to July 2018 admitted in Medical Clinic of Tambelan Sampit and Medical Clinic of Kampung Dalam in Eastern Pontianak, West Kalimantan, Indonesia.

METHODS

This study used the quantitative research with a descriptive approach (Cohen et al., 2007). This research was used by the Research and Development (R & D) adopted and adapted from Gall et.al (1983). These methods comprised of 1) introduction, 2) planning, 3) development of initial products, 4) initial field trial, 5) revision on the main products, 6) mainly field trials, and 7) revision on the operational products. Through the purposive sampling technique, it was decided that used to three secondary school level around Pontianak namely, SMP Negeri 4 Pontianak, SMP Negeri 8 Pontianak, and SMP Haruniyah Pontianak as a research sites for the subject collections in the determination of the student's response. Subjects in this study were students in grade 8 who had been educated with an excretion system with a total number of three students in each school for the initial field trials; while there were 12 students from each school for the main field trials. Instruments used in this study were a validation paper and a student response form. To identify the validity of contents, this picture storybook was validated by two validator experts. Then, it was measurably calculated using the formula below (Gregory, 2011):

$$\text{Content Validity} = \frac{\text{D}}{\text{A} + \text{B} + \text{C} + \text{D}}$$

Information:
A: Both juries disagreed
B: Jury I agreed; Jury II disagreed
C: Jury 1 disagreed; jury II agreed
D: Both juries agreed

From the results analysis of the content validity obtained, the assessment of criteria on the content validity was then continued to carry out (Amir et al., 2015).

Table 1. *Analysis criteria of content validity*

Score	Category
0,00 – 0,19	Content validity very low
0,20 – 0,39	Content validity low
0,40 – 0,59	Content validity medium
0,60 – 0,79	Content validity high
0,80 – 1,00	Content validity very high

The evaluation of the response form was conducted to determine the student's response referring to Riduwan' technique (2010). Each item response is scored with a value of one assigned to strongly disagree, all the way to five for strongly agree through Likert-type scale' Enochs and Riggs (1990). The positive scores encompassed score 5 (SA/Strongly Agree), 4 (A/Agree), 3 (N/Neutral), 2 (D/Disagree) and 1 (SD/Strongly Disagree); the negative scores comprised to 1 (SA/Strongly Agree), 2 (A/Agree), 3 (N/Neutral), 4 (D/Disagree) and 5 (SD/Strongly Disagree). Then, scores obtained from each statement were calculated using the formula below:

$$\text{Interval} = \frac{\text{Statement score}}{\text{the higest statement score}} \text{ x } 100\%$$

Based on the interval scores obtained from each statement, the criteria of interpretation of response scores was subsequently assessed by Riduwan' formula (2010) above.

Table 2. *Criteria of score interpretation*

Percentage (%)	Criteria
0 – 20	Very Weak
21 – 40	Weak
41 – 60	Moderate
61 – 80	Strong
81 – 100	Very Strong

RESULTS

This picture storybook contained a chapter of excretion system in human for students in grade 8. It also covered some information regarding an inflammation of bladder, Cystitis. Besides that, it also provided the data of patients with cystitis who had been admitted to Medical Clinics located in Tambelan Sampit and Kampung Dalam in Eastern Pontianak. This book was organized with a hope of providing real pictures about some incidences of a disease infecting human's organs, Cystitis.

The Results of Expert Validator's Assessment

The eligible instrument can be legitimately valid when it was confirmedly proven. The validity itself is a fundamental compartment used in marking scores in tools. It can be identified by some expert validators. According to Nurbaiti et al. (2017); Panjaitan et al. (2016); Panjaitan et al. (2019); Paramita et al. (2018); Titin et al. (2018), it was necessarily required to perform validation to justify an eligibility or validity of items. According to the average scores of the content validity, this picture storybook was eligible for education in schools. The assessed aspects by two expert validators consisted of format, language and content. The results of the eligibility assessment of this picture storybook as a learning tool in excretion system were shown on Table 3.

Table 3. *The results of content validity of this picture storybook in excretion system*

Aspects	Criteria	Validator Score		Score CV	Criteria CV
		1	2		
Format	Picture storybook is systematically structured	4	3	1.00	Very High
	Appropriate use of type, size and font colour	3	4		
	Clear images of display	3	4		

	Evaluation of questionnaires is systematically organised	3	3		
Content	Suitability of modules with BC, indicators and learning objectives	4	3	1.00	Very High
	Pictures fit with storylines	3	3		
	Suitability of the plot stories with the teaching modules	3	3		
	Use of picture storybooks in helping the comprehensive of students	3	3		
	Giving curiosity in students	4	3		
	Complexity of modules	3	3		
	Suitability of questionnaires evaluation with the teaching objectives	3	3		
Language	Use of an easily understandable language	3	4	1.00	Very High
Average scores of CV				1.00	Very High

Student's Response to the Picture Storybook

After doing some revisions based on the suggestions obtained from validators, it was then subsequently performed a field trial. The field trials were conducted in two steps: 1) the initial field trial and 2) the main field trial; where this field trial aimed to determine responses from students against this picture storybook that has been currently developed. The results of analysis of the response forms in the field trial were shown on Table 4. Entirely, the response of students regarding this picture storybook both in initial field trials and main field trials were positive.

Table 4. *The analysis results of student response forms on the field trials*

Dimension	**Indicator**	**Student Response**		
		Score (%) Results of Initial Field Trial	**Score (%) Results of Main Field Trial**	**Score Category**
Cognitive	Ease of understanding in the content of picture storybook	82.22	81.67	Very Strong
	Appropriate display of images and text	85.93	86.85	Very Strong
	Clarity of modules presented in a plot of story	85.56	86.11	Very Strong
Average		**84.57**	**84.88**	**Very Strong**
Affective	Curiosity	85.18	82.22	Very Strong
	Motivation	91.11	89.72	Very Strong
	Interest	91.85	89.82	Very Strong
Average		**89.38**	**87.25**	**Very Strong**
Conative	Tendency to read again	88.90	85.56	Very Strong
	Tendency to apply in daily life	90.01	92.50	Very Strong
Average		**89.46**	**89.03**	**Very Strong**
Total Average		**87.80**	**87.05**	**Very Strong**

DISCUSSION AND CONCLUSIONS

The Results of Expert Validator's Assessment

The aspects of format have consisted of four criteria with the total score of content validity (1.00) which can be identified as very high categories of the picture storybook was systematically comprised. As stated

by Sariani et al. (2017); Panjaitan et al. (2016), it was supposedly designed in a systematic way in order to achieve a better and effective learning process. Zain et al. (2013) also exhibited that the modules in a learning tool provided in a plot of stories should be systematically prearranged (FIGURE 1a). Previous studied by Suryaman (2006) had exhibited that the modules should be systematically provided and should concern on an easy access in comprehending lessons for students. This picture storybook also should pay more attention on types, sizes and font colors used (FIGURE 1b). According to Effendy e al. (2013), in order to present a good picture storybook types and sizes of font used were necessarily varied to prevent from the monotone impacts. The selection of types and sizes of font was also necessarily considered over the font clarity (Fadli et al., 2017). Besides, the clarity of pictures displayed was necessarily essential. The clear images with attractive colors can increasingly motivate students to study more (Afnida et al., 2016). On this picture storybook, the proposed images were placed on the same page to make student easy in understanding the contents (Effendy et al., 2013; Nurhaida et al., 2007). At the end of its sub-chapters, this book also provided some questionnaires arranged accordingly to the story plots presented. Overall, from the results of validation on the format, the validators suggested to modify some un-proportionally and imprecisely pictures as well as to add more answer keys at the last page of the modules.

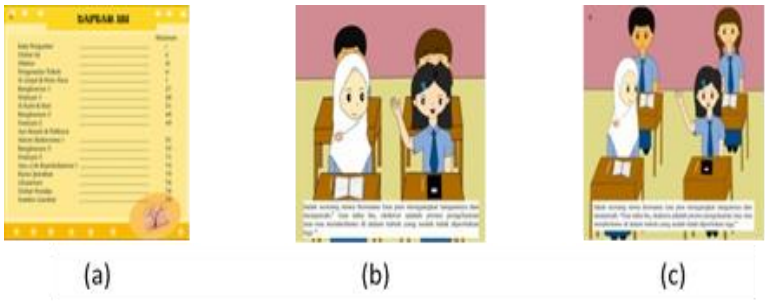

Figure 1. *(a) The display of the systematic content of storybook picture; (b) The un-proportionally picture before revision; (c) The proportional picture after revision*.

The aspects of content were consisted of seven criteria with the total score of content validity (1.00) which can be identified as very high categories. This showed that the presented modules in the picture storybook were suitable for the syllabus of Indonesian Curriculum 2013 for the basic competency, indicators and teaching objectives. Correspondingly demonstrated by Zuhrowati et al. (2018); Triyogantara and Juli (2017); Panjaitan et al. (2016); Panjaitan et.al (2019) described that the development of a learning tool, the presented modules should competently refers to the core competency (KI) and basic competency (KD) on the existing syllabus. Apart of that, the correspondence between images and story plots in the picture storybooks should be maintained in order to make students easily comprehend the provided segments of modules (FIGURE 2a). As stated by Panjaitan et al. (2016); Panjaitan et al. (2019) that the images displaying on the books should be systematically positioned and should follow the plots and sections provided, which this aimed to generate an integrated story plot. Moreover, Afnida et al. (2016); Faizah (2009) emphasised that the pictures and fonts in the books should be similarly connected as to creating a good story. However, the most concerned element was where the story plots accordingly follow straight to the currently existing teachings. According to Agatha et al. (2017); Panjaitan et al. (2016), the story plots were supposedly set in order and in a simple way, however this must remain fit accordingly to the area of modules delivered to helping students understanding them well. Referring to Yatno et al. (2015); Zain et al. (2013) that the modules provided in storylines can progressively encourage students to reading books.

The utilisation of picture storybooks was feasibly beneficial to promote students in comprehending modules, as to why this book was fully designed with the most attractive presentations. As suggested by Effendy et.al (2013), it was much better to exhibit pictures and stories related to daily life events, where the images can represent a description of abstract-related features and to clarify the elaboration of taught modules (Wahyuningsih, 2011). This was proven by Ribuati (2017) that the use of a picture storybook can elevate the student's understanding which result in student's outcomes. This developed picture storybook can increasingly trigger the curiosity of students to find more understanding of a segment in modules because this book included some informative and real materials associated to cystitis prevalence and the data of total patients with cystitis in Tambelan Sampit and Kampung Dalam in Eastern Pontianak (FIGURE 2b). As indicated by Marlinasari et al. (2018), the student's curiosity appeared when they found attracting things surrounding them, then they would be inspiringly motivated to discover, explore and learn new things.

This picture storybook has been significantly providing a complete segment in excretion system, in accordance to the scope of existing modules for students in grade 8. Corresponding to Panjaitan et al. (2016), the proposed modules were supposedly presented in a complete, accurate, systematics and short way. Suryaman (2006) also suggested that the proposed modules should be completely well-designed as to promoting students an effective problem solving. Moreover, this picture storybook had been completely enclosed with some questionnaires in accordance to the teaching's objectives. Overall, refereeing to the results of the content validity, the validators recommended to add some pictures and concept maps in order to have a more systematically look in the presented modules.

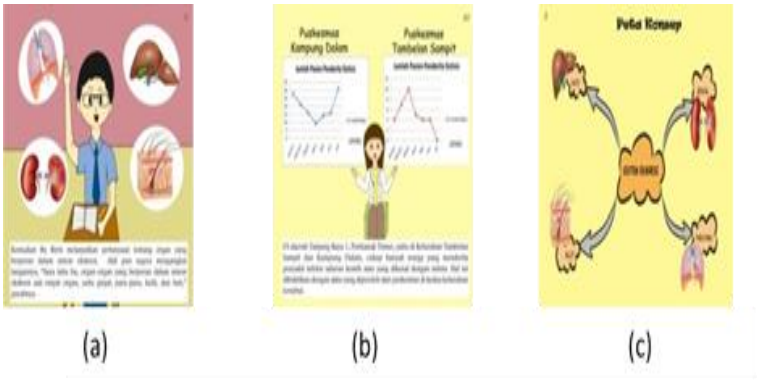

Figure 2. *(a) The accordance of picture and story plot; (b) The additional information on the total number of patients with cystitis; (c) The additional concept map.*

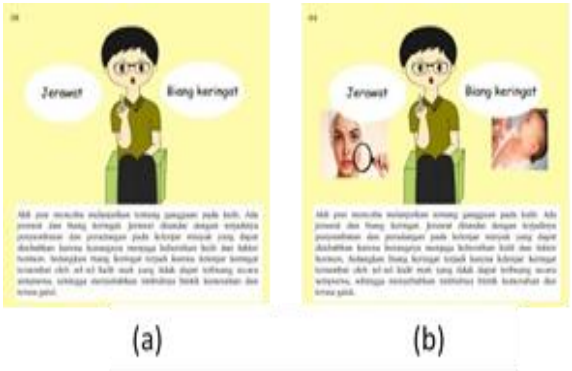

Figure 3. *(a) Unavailable disease picture before revision; (b) A disease picture added after revision*

The aspect of language was consisted of one criterion only with a total score of the content validity (1.00) which can be identified as very high categories. The presentation of this picture storybook had been carefully considered to have an easily understandable language. Puspita et al. (2018); Agatha et al. (2017); Yatno et al. (2015); Zain et al. (2013) recommended to apply a simple and communicative daily-used language in the picture storybook, so the students can easily absorb the modules. Overall, from the results of the language validation obtained, the validator experts recommended to modify some words that are inaccurate and can cause ambiguous.

Figure 4. *The use of easily understandable language*

Student's Response to the Picture Storybook

Responding of the reaction appeared in somebody while analyzing something using their sense as a result of an attitude (Hidayati & Muhammad, 2013). As a classified into three types: cognitive, affective and conative aspects (Kusuma & Aisyah, 2012; Hidayati & Muhammad, 2013; Sari et al., 2018). In the current study, it was found that responses from students in cognitive dimension both for the initial and main field trials were 84.57% and 84.88%, respectively. The cognitive dimension was measured by using three indicators: 1) the ease of understanding the content of a picture storybook; 2) the appropriate display of images and text; 3) the clarity of modules presented in storylines. An indicator of ease in understanding the content of a picture storybook was related to sentences presented; and the results of this study showed that the words used in this book were easy to understand for students in grade 8. Also, Agatha et al. (2017); Yatno et al. (2015) revealed that communicative language was more necessarily used in a learning tool to benefit student understanding modules. Besides, the storyline presented must involve examples of daily life with illustrations to make students comprehend the meaning of them (Yatno et al., 2015; Zain et al., 2013). The results of the assessment in an indicator of appropriate displays of images and text demonstrated that this picture storybook had been carefully considered to have an integrated story plot. Not only that, in order to encourage students in reading and absorbing the contents this book also should notice on harmony of the position of images and text (Effendy et al., 2003; Nurgiyantoro, 2005). The position of images in a script played an essential role to clarify the content of scripts (Damopolii, 2018; Sitepu, 2005) and to elaborate an abstract feature (Effendy et al., 2003). The assessment of a content clarity indicated that the presented story plots have complied and were simple; where it was assumed that it can beneficially help students to easily recognize the modules. Apart of presenting modules through storylines, this book also provided a summary at every end of sub-chapters. This summary aimed to the scripts arranged in order and to help students identifying the essence of modules presented.

The students' responses on the affective dimension consisted of three indicators: 1) curiosity; 2) motivation; and 3) interests. The assessment results of both initial and main field trials were 89.38% and 87.25%, respectively. This result meaningfully showed that this picture storybook can trigger curiosity, motivate and attract students. Marlinasari et al. (2018) stated that a print media accessible in storybooks should display attractive pictures, harmonic colors as well as a good feature in order to induce curiosity in students over the modules read. Besides that, story plots in a picture storybook arranged systematically according to daily incidents in life may also bring curiosity in students as if they experienced that events by themselves (Yatno et al., 2015; Zain et al., 2013). Afterward, the assessment of the motivational indicators exhibited that this assessment was mostly related to the enthusiasm and interest in student learning. Motivation in students can be raised by something interesting. Moreover, Zuhrowati et al. (2018); Yatno et al. (2015); Zain et al. (2013); Anggara et al. (2014) revealed that the picture storybook can increase student's motivation and interest in reading (Zuhrowati et al., 2018; Afnida et al., 2016) as well as student's activity in learning (Adipta et al., 2016; Faizah, 2009). The results of the assessment on the indicator of interests exhibited that the displayed colourful images on every pages and storylines with daily living illustrations can fetch students interested in reading. Also, Zuhrowati et al. (2018); Yatno et al. (2015); Zain et al. (2013) indicated that students were more interested in books packaged with attracting images and colors as well as containing daily life events.

The results of the assessment on the conative dimension had percentages at 89.46% and 89.03% for initial and main field trials, respectively. The conative dimension measured the student's response against two indicators: 1) tendency to re-read; and 2) tendency to apply the knowledge in daily life. The results of the assessment on indicators of a tendency to re-read indicated the presence of student interest in reading again the books; and the tendency indicators applied in everyday life exhibited a positive response from students. This student's response suggested that this picture storybook containing everyday life with images and stories can be beneficial for students in appliance of daily life events, primarily related to the maintenance of excretion organs. Nurhaida et al. (2007) stated that images can make an effective appeal, both increase and decrease in attitude. In line with that Anggara et al. (2014) pointed that images on the books can stimulate and develop imagination in students; and to help engage with the positive vibes from the stories in the books. The students whose positive responses meaningfully indicated that they had become more enthusiastic to know on how to maintain the health of excretion system and to apply the insights in daily life. In sum, this picture storybook with a chapter of excretion system in human is eligibly used and recommended as a learning tool in schools, in which received a positive response from students. Furthermore, this picture storybook is encouragingly suggested to be applied in the learning process in order to understand its effects on the student leaning outcomes.

ACKNOWLEDGEMENTS

We would like to thank medical practitioners and staff in medical clinics in Tambelan Sampit and Kampung Dalam, Eastern Pontianak, Pontianak Indonesia who had been willingly available to share information regarding cystitis prevalence and the total number of patients admitted in the clinics. A big appreciation was also addressed to the natural science (IPA) teachers and groups of students in the secondary school level of SMP Haruniyah, SMP Negeri 4 Pontianak, and SMP Negeri 8 Pontianak that had contributed in this study. Thanking also tailored to validator experts (lectures from the study program in Biology Education at Faculty of Teacher Training and Education, Tanjungpura University) who had generously taken part in the assessment of content validity in this finding.

REFERENCES

Adipta, H,. Maryaeni, & Hasanah, M. (2016). Pemanfaatan buku cerita bergambar sebagai sumber bacaan siswa SD. Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan, 1(5), 989-992.

Afnida, M., Fakhriah, & Fitriani, D. (2016). Penggunaan buku cerita bergambar dalam pengembangan bahasa anak pada TK A di Banda Aceh. Jurnal Ilmiah Mahasiswa Pendidikan Anak Usia Dini, 1(1), 52-59.

Agatha, N. D., Prihatin, J., & Narulita, E. (2017). Development of the circulatory system comic book. Jurnal Bioedukatika, 5(2), 59-64.

Ambarwati, V., & Wibowo, Y. (2018). Pengembangan media pembelajaran interaktif berbasis flash materi sistem ekskresi untuk siswa kelas XI SMA/MA. Jurnal Prodi Pendidikan Biologi, 7(4), 274-285.

Ami, M. S., Susantini, E., & Raharjo. (2012). Pengembangan buku saku materi sistem ekskresi manusia di SMA/MA kelas XI. BioEdu, 1(2), 10-13.

Amir, M., Muhris, & Arsyad, M. (2015). Pengembangan perangkat pembelajaran berbasis pengalaman pada peserta didik kelas XI IPA SMA Negeri 9 Pinrang. Jurnal Sains dan Pendidikan Fisika, 11(3), 202-213.

Anggara, M. B., Waluyanto, H. D., & Zacky, A. (2014). Perancangan buku cerita interaktif pendidikan karakter untuk anak usia 4-6 tahun. Jurnal Desain Komunikasi Visual Adiwarna, 1(4), 1-11.

Astuti, R., Panjaitan, R. G. P., & Yokhebed. (2016). Kelayakan media komik elektronik pada pembelajaran submateri zat aditif di SMP. Jurnal Pendidikan dan Pembelajaran, 5(8), 1-12.

Bingimlas, K. A. (2009). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. EURASIA J Math Sci Tech Ed, 5(3), 235-245.

Cohen, L., Manion, L., & Morrison, K. (2007). Research methods in education 6th edition, is essential reading for both the professional researcher and anyone involved in educational research. New York: Routledge.

Dachmiati, S. (2015). Program bimbingan kelompok untuk mengembangkan sikap dan kebiasaan belajar siswa. Faktor Jurnal Ilmu Kependidikan, 2(1), 10-21.

Damopolii, I. (2018). Menggunakan komik sains dalam mengajarkan konsep sistem pencernaan pada manusia. Lectura: Jurnal Pendidikan, 9(1), 35-42.

Damopolii, I., & Nunaki, J. H. (2016). Pengembangan media pembelajaran komik IPA terpadu materi sistem pencernaan pada manusia. Pancaran Pendidikan, 5(3), 61-70.

Daud, F., & Rahmadana, A. (2015). Pengembangan media pembelajaran biologi berbasis e-learning pada materi sistem ekskresi kelas XI IPA 3 SMAN 4 Makassar. Jurnal Bionature, 16(1), 28-36.

Effendy, Y., Bangsa, G., & Yudani, H. D. (2013). Perancangan buku cerita bergambar dang gedunai untuk anak usia 4-6 tahun. Jurnal Desain Komunikasi Visual Adiwarna, 1(2), 1-10.

Embun, S., & Astuti, M. (2015). Pengaruh penggunaan media gambar terhadap aktivitas belajar siswa pada mata pelajaran IPA materi bumi dan cuaca di Madrasah Ibtidaiyah Najahiyah Palembang. JIP: Jurnal Ilmiah PGMI, 1(1), 81-107.

Fadli, R., Sartono, N., & Suryanda, A. (2017). Pengembangan kamus berbasis sistem operasi telepon pintar pada materi biologi SMA kelas XI. Jurnal Pendidikan Matematika dan IPA, 8(2), 10-17.

Faizah, U. (2009). Keefektifan cerita bergambar untuk pendidikan nilai dan keterampilan berbahasa dalam pembelajaran bahasa Indonesia. Cakrawala Pendidikan, 28(3), 249-256.

Gall, M. D., Gall, J. P., & Borg, W. R. (1983). Educational research an introduction 3rd edition. USA: Pearson Education.

Gregory, R. J. (2011). Psychology testing history, principles, and applications 6th edition. Jakarta: Erlangga.

Hidayati, N., & Muhammad, H. N. (2013). respon guru dan siswa terhadap pembelajaran permainan bola voli yang dilakukan dengan pendekatan modifikasi: Pada siswa kelas V SDN Wateswinaguni Sambeng-Lamongan. Jurnal Pendidikan Olahraga dan Kesehatan, 1(1), 104-106.
Hilyana, F. S. (2017). Pengembangan media pembelajaran LKS untuk meningkatkan kompetensi bekerjasama dan memecahkan masalah siswa. Pancasakti Science Education Journa,l 2(1), 11-21.
Insani, M. D. (2016). Studi pendahuluan identifikasi kesulitan dalam pembelajaran pada guru IPA SMP se-Kota Malang. Jurnal Pendidikan Biologi, 7(2), 81-93.
Isnaningsih & Bimo, D. S. (2013). Penerapan lembar kegiatan siswa (LKS) discovery berorientasi keterampilan proses sains untuk meningkatkan hasil belajar IPA. Jurnal Pendidikan IPA Indonesia 2(2), 136-141.
Kozma, R. B. (1991). Learning with media. Review of Educational Research, 61(2), 179-211.
Kusuma, F. W., & Aisyah, M. N. (2012). Implementasi model pembelajaran kooperatif tipe think pair share untuk meningkatkan aktivitas belajar akuntansi siswa kelas XI IPS 1 SMA Negeri 2 Wonosari tahun ajaran 2011/2012. Jurnal Pendidikan Akuntansi Indonesia, 10(2), 43-63.
Marlinasari, Mashuri, M. T., & Solehah, G. H. (2018). Pengaruh media pembelajaran komik terhadap minat belajar kimia siswa pada materi koloid di kelas XI MIA MAN 1 Banjarmasin. Dalton: Jurnal Pendidikan Kimia dan Ilmu Kimia, 1(1), 30-33.
Ministry of Education Indonesia (2013). Materi pelatihan guru implementasi kurikulum 2013 SMP/MTs IPA. Jakarta: Badan Pengembangan Sumber Daya Manusia Pendidikan dan Kebudayaan dan Penjaminan Mutu Pendidikan Kementerian Pendidkan dan Kebudayaan RI.
Mustari, M., & Sari, Y. (2017). Pengembangan media gambar berupa buku saku fisika smp pokok bahasa suhu dan kalor. Jurnal Ilmiah Pendidikan Fisika Al-Biruni, 6(1), 113-123.
Nahar, N. I. (2016). Penerapan teori belajar behavioristik dalam proses pembelajaran. Nusantara (Jurnal Ilmu Pengetahuan Sosial), 1, 64-74.
Noviyanti, A. (2016). Aktivitas guru dan siswa dalam pembelajaran sistem ekskresi dengan menggunakan metode peta konsep di SMPN 2 Banda Aceh. Jurnal Pendidikan Serambi Ilmu, 24(1), 1-7.
Nurbaiti, Panjaitan, R.G.P., & Titin. (2017). The properness of adobe flash basis interactive media for respiratory system learning material. Unnes Science Education Journal, 6(3): 1662-1668.
Nurgiyantoro, B. (2005). Sastra anak: Pengantar pemahaman dunia anak. Yogyakarta: Gadjah Mada University Press.
Nurhaida, I., Hariyanto, S. P., Junaidi, A., & Syah, P. (2007). Merancang media hiburan buku cerita bergambar menjadi media belajar untuk alat bantu komunikasi. Mediator, 8(1), 51-64.
Nuryanti. (2016). Peningkatan kemampuan komunikasi dan berpikir kritis matematis melalui model kooperatif STAD dan murder. Jurnal Pengajaran MIPA, 21(1), 9-13.
Panjaitan, R. G. P., Savitri, E., & Titin. (2016). Pengembangan media e-comic bilingual sub materi saluran dan kelenjar pencernaan. Unnes Science Education Journal, 5(3), 1379-1387.
Panjaitan, R. G. P., Sari, D. P., Wahyuni, E. S., & Shidiq, G. A. (2019). Feasibility of human excretory system module in biology learning. Jurnal Penelitian dan Pembelajarn IPA, 5(1), 84-93.
Paramita, R., Panjaitan, R. G. P., & Ariyati, E. (2018). Pengembangan booklet hasil inventarisasi tumbuhan obat sebagai media pembelajaran pada materi manfaat keanekaragaman hayati. Jurnal IPA dan Pembelajaran IPA, 2(2), 83-88.
Pratiwi, D. K. P., & Sudibyo, E. (2018). Keefektifan penggunaan media pembelajaran komik pada materi gerak untuk meningkatkan minat baca siswa SMP kelas VIII. Pensa E-Jurnal-Pendidikan Sains, 6(2), 290-295.
Primasari, R., Zulfiani, & Yanti, H. (2014). Penggunaan media pembelajaran di madrasah aliyah negeri se-Jakarta Selatan. Edusains, 6(1), 68-72.
Purwanto, D., & Yuliani. (2013). Pengembangan media komik IPA terpadu tema pencemaran air sebagai media pembelajaran untuk siswa SMP kelas VII. Pensa E-Jurnal: Pendidikan Sains, 1(1), 71-76.
Puspita, E., Hariyadi, B., & Muswita. (2018). The development of mangrove video instructional media for high school students and societies in the coastal areas of Jambi. Jurnal Bioedukatika, 6(2), 48-58.
Qumillaila, Susanti, B. H., & Zulfiani. (2017). Developing android augmented reality as a learning media of human excretory system. Cakrawala Pendidikan, 36(1), 57-69.
Retariandalas. (2017). Pengaruh minat baca dan motivasi belajar terhadap prestasi belajar IPA siswa. Jurnal Formatif, 7(2), 190-197.
Ribuati, W. (2017). Penggunaan media cerita bergambar dalam peningkatan hasil belajar IPA materi bumi dan langit bagi siswa kelas 4 SDN Patereman 1 Kecamatan Modung Kabupaten Bangkalan. Keguru: Jurnal Ilmu Pendidikan Dasar, 1(1), 1-13.
Riduwan. (2010). Dasar-dasar statistika. Bandung: Alfabeta.

Sari, D. P., Panjaitan, R. G. P., & Wahyuni, E. S. (2018). Respon siswa terhadap modul sistem eksresi manusia pada pembelajaran biologi kelas XI SMA. Jurnal Pendidikan dan Pembelajaran, 7(3), 1-10.

Sariani, N., Muryani, C., & Rindarjono, M. G. (2017). Pengembangan modul pembelajaran geografi berbasis peduli lingkungan untuk meningkatkan sikap peduli lingkungan siswa pada materi sumber daya alam di kelas XI IPS SMA Bina Utama Pontianak. Jurnal GeoEco, 3(1), 40-46.

Shidiq, G. A., & Faikhamta, C. (2020). Exploring the relationship of teachers' attitudes, perceptions, and knowledge towards integrated STEM. Elementary Education Online, 19(4), 2514-2531.

Sitepu. (2015). Memilih buku pelajaran. Jurnal Pendidikan Penabur, 4(4), 113-126.

Suryaman, M. (2006). Dimensi-dimensi kontekstual di dalam penulisan buku teks pelajaran bahasa Indonesia. Diksi, 3(2), 165-178.

Tahki, K. (2014). Pengukuran sikap siswa yang mengikuti ekstrakurikuler tenis meja. Jurnal Pendidikan Olahraga, 3(2), 169-181.

Tileston, D. (2003). The importance of media in the classroom. What Every Teacher Should Know About Media & Technology, 1-7.

Titin, Panjaitan, R. G. P., & Yuliana, Y. G. S. (2018). The development of character-based documentary film for the materials of reproductioin system. Unnes Science Education Journal, 7(3), 251-258.

Triyogantara, N. S., & Juli, S. (2017). Development of physics magazine leraning media "physicsmagz" through clenovio based apps to increase the learning interest and creative thinking skill of the senior high school students. Jurnal Pendidikan Fisika, 6(6), 471-478.

Van Driel, J. H., Beijaard, D., & Verloop, N. (2001). Professional development and reform in science education: The role of teachers' practical knowledge. Journal of Research in Science Teaching, 38(2), 137–158.

Wahyuni, S. (2010). Menumbuhkembangkan minat baca menuju masyarakat literat. Diksi, 17(1), 179-189.

Wahyuningsih, A. N. (2011). Pengembangan media komik bergambar materi sistem saraf untuk pembelajaran yang menggunakan strategi PQ4R. Jurnal Penelitian Pendidikan (JPP), 1(2), 102-110.

Yatno, R., Susilowati, S. M. E., & Dewi, N. R. (2015). Media pembelajaran berbentuk komik berpendekatan pengembangan kontekstual pada materi bunyi untuk siswa SMP/MTs. Unnes Science Education Journal, 4(2), 828-834.

Zain, N. H., Parmin, & Sumarni, W. (2013). Pengembangan komik bahan ajar IPA terpadu kelas VIII SMP pada tema sistem pencernaan manusia dan hubungannya dengan kesehatan. Unnes Science Education Journal, 2(1), 217-222.

Zuhrowati, M., Abdurrahman, & Suyatna, A. (2018). Pengembangan komik sebagai media pembelajaran IPA pada materi pemanasan global. JPF: Jurnal Pendidikan Fisika, 6(2), 144-158.