



BERKALA ILMIAH PENDIDIKAN FISIKA

<https://ppjp.ulm.ac.id/journal/index.php/bipf>

Development of Android-Based Learning Media on Dynamics and Atmospheric Stability Material

Yayat Ruhiat, Suherman, and Hesti Gustini

Education Technology, Universitas Sultan Ageng Tirtayasa, Serang, Indonesia
hestigustini16@gmail.com

DOI:10.20527/bipf.v11i3.16163

Received: 6 May 2023 Accepted: 21 October 2023 Published: 28 December 2023

Abstract

By employing device technology, or what is known as mobile learning, this project intends to create Android-based goods as learning mediums. A different type of learning medium is mobile learning. The availability of mobile learning can facilitate learning for students by enabling them to acquire difficult content anywhere and at any time. This content was created in a visual and audiovisual style for Android. The ADDIE Development model and research in research and development (R&D) are utilized to accomplish this purpose. This paradigm's five steps are analysis, design, development, implementation, and evaluation. Material expert and material expert tests were performed to evaluate the consistency of the medium and content. A very practical category was produced due to the two experts' determination of the product's validity. Tests on material experts were conducted to ascertain the coherence between the medium and the material. The two experts' product results were valid, and they created a workable category. The media experts' validation results averaged 90.06%, which met the "very valid" criteria, while the material validation results averaged 80.91%, which met the "very valid" criteria. It is recommended that every teacher in the school be more creative in creating online learning content that is not boring and more effective.

Keywords: ADDIE; Android; Learning media

© 2023 Berkala Ilmiah Pendidikan Fisika

How to cite: Ruhiat, Y., Suherman, S., & Gustini, H. (2023) Development of android-based learning media on dynamics and atmospheric stability material. *Berkala Ilmiah Pendidikan Fisika*, 11(3), 300-309.

INTRODUCTION

Technology is now being used in education in more complex ways. Media development is frequently used to increase learning flexibility (Siahaan et al., 2021; Solikhin & Wijanarko, 2021). Smartphone users are increasing along with the development of science and technology, which is very fast. Almost all human activities can be controlled by

science and technology. The number of active smartphone users in Indonesia has reached more than 190 million people, an estimate made by the digital marketing research institute Emarketer. This figure makes Indonesia the fourth largest active smartphone user country in the world after China, India, and America (Sadya, 2022; Siahaan et al., 2021).



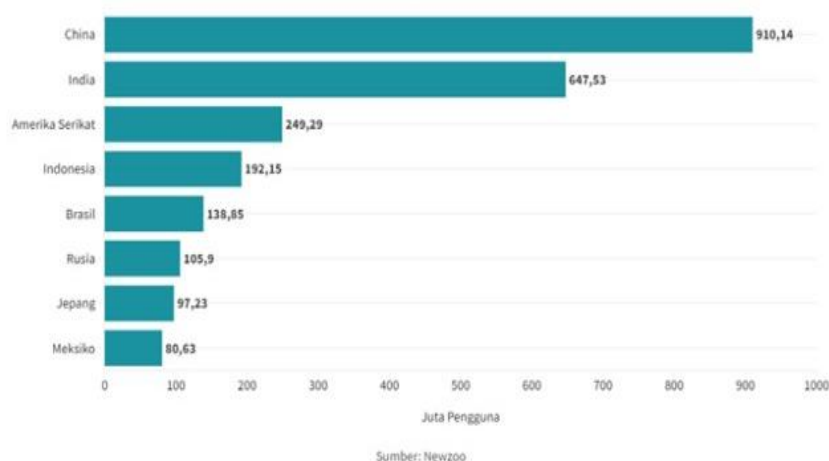


Figure 1 Eight countries with the most smartphone users in the world (2022)

The Figure 1 shows that the growth of Indonesian people cannot be separated from smartphones. Almost all people, both children and adults, can use and have smartphones. Approximately 70% of people who own a mobile phone use an Android smartphone. Because of its widespread use, malware attacks against the Android operating system are common (Muzaffar et al., 2022; Su et al., 2017). Smartphone users have a large number at the level of middle school students to undergraduate students. This is influenced by digital developments in the world of education that have helped a lot of ordinary and rigid mindsets to become more modern (Ainun, 2022; Khoer et al., 2021). An educator should be able to relate currently developing technology to the learning process. The achievement of learning objectives is related to learning media, one of the supporting factors (Bhakti & Dwi, 2018; Handayani et al., 2023). Using the right media can reduce passivity and increase student motivation. The use of technology in the learning process is very important. Technology can help students and teachers interact (Annisa & Asrizal, 2022).

In line with the opinion expressed by Nurul et al. (2020) and Sumadi et al. (2022) that learning media is anything capable of delivering messages or lesson

content, feelings, thoughts, attention, and abilities of students so that they can support the learning process and help students understand the material more easily, the learning process also runs effectively and efficiently so that the expected goals are easy to achieve. According to validation results from media experts and the outcomes of student trials, the learning media efficacy employed in the multimedia learning courses was assessed to be "Very Reasonable" in usage (Pahlifi & Fatharani, 2019; Supriadi et al., 2020).

The development of mobile learning-based learning media has begun, for example, by Dimas & Bakti (2016), which produces learning media based on Chemo-Edutainment that has educational value and is entertaining and fun for its users. Learning media must be developed as easily as possible so students can easily understand a concept. Therefore, Android-based mobile learning is the right learning media to support learning the times (Astuti et al., 2018).

Learning media that uses smartphone technology is called mobile learning. Mobile learning is an alternative to developing learning media. Mobile learning can be an effort to improve the quality of learning by trying to break through the limitations of space and time

(Darmawan, 2016; Şad & Niyazi Özera, 2020). The development of ICT has provided various innovations for integrating ICT into learning and also required the application of ICT in learning (Jurayev, 2023; Ulfa & Sucahyo, 2022). Mobile learning is intended to complement learning and provide opportunities for students to learn material not understood anywhere and anytime (Fatimah & Mufti, 2014).

This research produces mobile learning media products based on the Android platform that can be accessed using a cell phone. Android is a Linux-based operating system intended for mobile devices. Android is the most popular operating system in the community because it has advantages such as its open-source nature, which allows developers to create applications (Afif & Haryudo, 2016; Dian & Kustijono, 2013). Android can simply be interpreted as software used on mobile devices, including an operating system, middleware, and key applications released by Google (Tim EMS, 2015). The Android operation used is the Lollipop version for smartphones. Researchers develop learning media for the dynamics and stability of the atmosphere.

The results of identifying the characteristics of the majority of students who have smartphones and use the internet to obtain information or references for their needs in completing college assignments every day. The results of this identification support the need to make new findings based on science and technology by conducting Android-based learning media on atmospheric dynamics and stability.

The developer's novelty was adding audio to learning media and making designs through Canva and PowerPoint media so that the product results are in the form of .apk files downloaded on Google Drive.

METHOD

The literature agrees that research and development (R&D) is essential to creating reliable and long-lasting innovation machinery. In particular, present R&D initiatives boost the likelihood that future research will use technology advancements and establish a knowledge base for appropriateness (Miroshnychenko & Massis, 2020). This research procedure adapts the ADDIE development model, which is a development model consisting of five stages of Analysis, Design, Development, Implementation, and Evaluation, but this study focuses on the Analysis, Design, and Development. The development of the ADDIE model is also used in research based on developing learning media (Dwitiyanti et al., 2020)

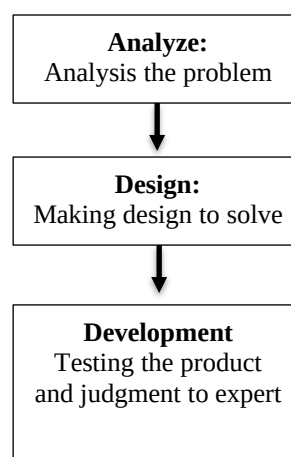


Figure 2 Flowchart model ADDIE

The selection of the ADDIE model is based on the consideration that this model is composed of several systematic sequences based on needs, problem-solving, and the characteristics of learning Indonesian; however, this research focuses on the Analysis, Design, and Development stages because this development model is a model that focuses more on products so that it is suitable for developing smartphone-based learning media content, after

getting the results of product validation tested on students and evaluated.

The qualitative data that had been attained using the media quality assessment sheet should be converted into the quantitative data under the following scale: 1 = Very Poor (VP); 2 = Poor (P); 3 = Moderate (M); 4 = Good (G); and 5 Very Good (VG). Then, the quantitative data were calculated and categorized based on

The quality criteria that might be consulted are in Table 1. The results are then converted into a qualitative form using the conversion guidelines in Table 1.

Table 1 Validity criteria

Percentage	Criteria
81% - 100%	Very Valid
61% - 80%	Valid
41% - 60%	Fairly Valid
21% - 40%	Invalid
0% - 20%	Very invalid

(Jannah & Julianto, 2018)

RESULT AND DISCUSSION

The result of the development entitled "Development of Android-Based Learning Media on Dynamics and Atmospheric Stability Material" is a .apk file product that can be uploaded via a smartphone. This learning media product was created and designed by the developer himself to use as a teacher's tool in conveying material and as an independent learning resource that students can access anytime and anywhere.

The ADDIE paradigm is often applied to instructional development but can also be applied to making models, learning approaches, learning methods, media, and teaching materials (Puspasari, 2019). Effective ADDIE instructional design focuses on authentic tasks, complex knowledge, and original problems (Hidayat & Nizar, 2021).

The development of this learning

media uses the ADDIE model. The development model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation, but this study focuses on the Analysis, Design, and Development stages. The stages of the ADDIE development model in Research and Development (R&D) research have been completed. The ADDIE stages are often used in instructional development and in making models, learning approaches, media, methods, and learning materials (Puspasari, 2019). The steps for developing Android-based mobile learning are as follows.

Analysis, at this stage, material analysis and learning media analysis are carried out. From this analysis, material that requires media assistance as a teacher's tool in conveying material and can be used by students for independent learning is the dynamics and stability of the atmosphere because the material requires concrete things to make it easier for students to understand the material. The application of learning media can assist teachers in providing concrete material from abstract material.

Design, at this stage, includes making storyboards and media flowcharts and adjusting materials, images, and videos that are appropriate to the material to be explained. Then, create material in the Canva application, which is then imported in PowerPoint form after importing components and audio.

Development: at this stage, the developer begins to develop media according to the storyboard design stages that have been designed previously. Developers create layouts in the Canva application while inserting material text, images, and graphics. The product display can be seen in Figures 3 and 4.

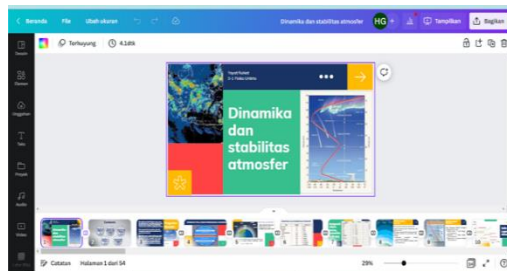


Figure 3 Creating a layout for the Canva application

Then, upload it in PowerPoint and insert audio as needed. The developer uses the i-spring suite to publish in HTML form at this stage.

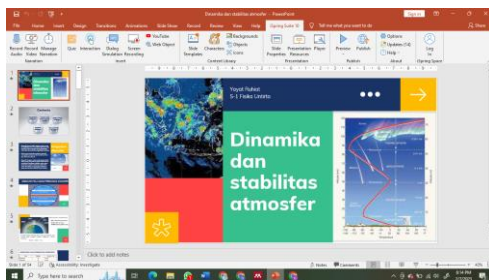


Figure 4 Audio input process on PowerPoint and publish with i-spring suite

In the final stage, the developer changes the PowerPoint file to the iSpring Suite 9 android application and the Website to APK Builder. Then, we upload the application to Google Drive to make it easier for students to access. Students can open the Google Driver link that has been shared and download the .apk file to be downloaded on their respective smartphones. The display of this part can be seen in Figure 5.

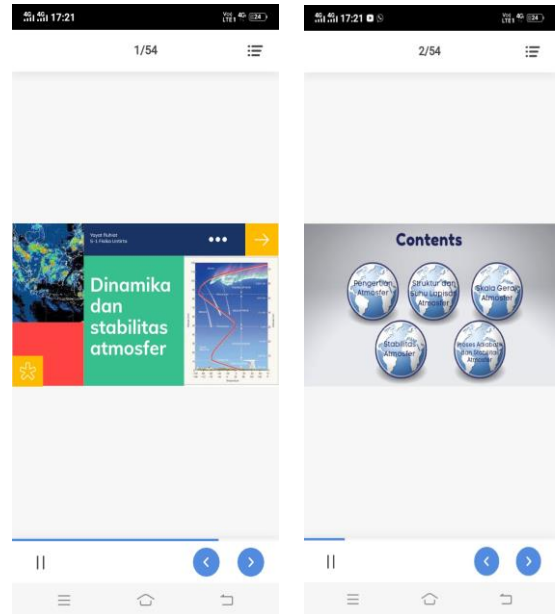


Figure 5 Display of learning media on android

Feasibility Results for Canva Application-Based Animated Video Media

Media and material experts assess the results of the feasibility test of the resulting animated videos. Media validation is used to evaluate product designs carried out by experienced experts (Dewanti et al., 2018). The goal is to determine whether the media and material are coherent. Validation is carried out by knowledgeable validators who evaluate a product based on references/aspects/indicators in the validation instrument (Silmi & Rachmadyanti, 2018). The following is a presentation of data analysis and media expert responses. The results of the assessment can be seen in Table 2.

Table 2 Media expert validation results

Aspect	Indicator	No. grain	Average Percentage	Criteria
Visual	Display alignment with background.	1	98%	Very Valid
	Interesting color combination.	2		
	Alignment of image settings and animation	3		
	Correspondence between the presentation of the image with discussed material	4		
	Clear writing animation display and interesting	5		
	Illustrations are easy to understand and appropriate with everyday life	6		
Audios	Background compatibility with narrative	7	88.9%	Very Valid
	Sounds clear	8		
	Match between sound and animation	9		
Quality	Good video quality	10	86.67%	Very Valid
Fill	Fill in the video coherently according to the material	11	86.67%	Very Valid
Average			90.06%	Very Valid

The overall average percentage of validation results shows the "Very Valid" criteria, with an average of 90.06%. These findings imply that using augmented reality media can improve student learning outcomes and generate motivation for learning, positive attitudes, and a sense of familiarity with the learning process. Android-based learning media products have the following qualities: a wide variety of content that is complete, useful, interesting, efficient, and flexible; they can be used anywhere and anytime; they have evaluations of different questions; as a result, students can repeat the

material independently without being constrained by time or place; they are also capable of enhancing memory for the materials. As a result, using this learning resource helps students better grasp the concepts covered in the Diesel Motor course. It also gives them insight into using technology, particularly Android, for educational reasons (Irawan, 2021; Khoer et al., 2021). After receiving suggestions from the material and media validators regarding various components, repairs or adjustments were made (Silmi & Rachmadyanti, 2018). The results of the assessment can be seen in Table 3.

Table 3 Material expert validation results

Aspect	Indicator	No. grain	Average Percentage	Criteria
Appropriateness Fill	Compatibility of contents with KD and indicators	12	66.25%	Valid
	Systematic presentation of material	13		
	Illustrations that support the clarity of the material	14		
	Interesting video appearance	15		
Eligibility of media Presentation	The ease of understanding the material using animated video	16	95.56%	Very Valid
	The suitability of color combinations, writing, and images	17		
	The clarity of the image illustration	18		
Average			80.91%	Valid

The average percentage validation obtained by material experts is 80.91%, indicating that the Android application-based animated video media material is included in the "Valid" criteria. Android-based mobile learning media integrated with the scientific approach developed on colligative solutions have very suitable criteria for learning activities (Pahlifi & Fatharani, 2019; Putri et al., 2021). Media can be used when offline or does not require a quota, but the device used must have sufficient memory to be able to download the application.

CONCLUSION

From the research results, it can be concluded that Android-based learning media has been successfully designed. This media will then be tested for media validation and material, which can be used as learning media. The results of this development product are in the form of an Android-based learning media application that can be downloaded on the Google Driver link. Use of Based Learning Media Android has positively impacted development. Understanding of students can use this learning media to understand material anywhere and anytime.

REFERENCES

- Afif, M., & Haryudo, S. (2016). Pengembangan media pembelajaran berbasis android pada mata pelajaran instalasi tenaga listrik untuk meningkatkan hasil belajar siswa. *Jurnal Pendidikan Teknik Elektro*, 5(2).
- Ainun, F. P. (2022). Identifikasi transformasi digital dalam dunia pendidikan mengenai peluang dan tantangan di era disrupsi. *kewarganegaraan*, 6(1), 1570–1580.
- Annisa N, & Asrizal, A. (2022). Design and validity of stem integrated physics electronic teaching materials to improve new literacy of class xi high school students. *Jurnal Pendidikan Fisika*, 10(3), 177–192. <https://doi.org/10.26618/jpf.v10i3.7900>
- Astuti, I. A. D., Dasmo, D., & Sumarni, R. A. (2018). Pengembangan media pembelajaran berbasis android dengan menggunakan aplikasi appypie di smk bina mandiri depok. *Jurnal Pengabdian Kepada Masyarakat*, 24(2), 695. <https://doi.org/10.24114/jpkm.v24i2.10525>
- Bhakti, Y. B., & Dwi, A. I. A. (2018). The influence process of science

- skill and motivation learning with creativity learn. *Journal of Education and Learning (EduLearn)*, 12(1), 30–35. <https://doi.org/10.11591/edulearn.v12i1.6912>
- Darmawan, D. (2016). *Mobile Learning: sebuah aplikasi teknologi pembelajaran*. Jakarta Rajawali PERS.
- Dewanti, H., Toenlioë, A. J. E., & Soepriyanto, Y. (2018). Pengembangan media pop-up book untuk pembelajaran lingkungan tempat tinggalku kelas iv sdn 1 pakunden kabupaten ponorogo. *Jurnal Kajian Teknologi Pendidikan*, 1(3), 222. <http://journal2.um.ac.id/index.php/jkt/article/viewFile/4551/3408>
- Dian, A. R., & Kustijono, R. (2013). Pengembangan media animasi fisika pada materi cahaya dengan aplikasi flash berbasis android. *Jurnal Penelitian Fisika dan Aplikasinya (JPFA)*, 3(1), 11. <https://doi.org/10.26740/jpfa.v3n1.p11-18>
- Dimas, G. R., & Bakti, M. S. B. U. (2016). Pengaruh penggunaan media mobile learning berbasis android dan lks dalam model pembelajaran student team achivement division (stad) terhadap prestasi belajar ditinjau dari kemampuan memori pada materi pokok sistem koloid kelas xi sma negeri 2 purwokerto tahun ajaran 2015/2016. *Jurnal Pendidikan Kimia Universitas Sebelas Maret*, 5(4). <https://jurnal.fkip.uns.ac.id/index.php/kimia/article/view/9019/6917>
- Dwitiyanti, N., Kumala, S. A., & Widiyatun, F. (2020). Using the ADDIE model in development of physics unit conversion application based on Android as learning media. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 10(2), 125–132. <https://doi.org/10.30998/formatif.v10i2.5933>
- Fatimah, S., & Mufti, Y. (2014). Pengembangan media pembelajaran ipa-fisika smartphome berbasis android sebagai penguat karakter sains siswa. *Kaunia: Integration and Interconnection Islam and Science*, 10(1), 59–64. <http://ejournal.uin-suka.ac.id/saintek/kaunia/article/view/1066>
- Handayani, D., Ginting, S. M., & Alperi, M. (2023). *The development of android-based learning media for organic chemistry i* (Vol. 1). Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-012-1_9
- Irawan, R. (2021). Literature study: utilization of android-based learning media using adobe flash CS 6 (As An educational solution during the covid-19 pandemic). *Journal of Physics: Conference Series*, 1940(1). <https://doi.org/10.1088/1742-6596/1940/1/012127>
- Jannah, M., & Julianto, J. (2018). Pengembangan media video animasi digestive system untuk meningkatkan hasil belajar siswa mata pelajaran ipa kelas v. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, 6(2).
- Jurayev, T. N. (2023). The use of mobile learning applications in higher education institutes. *Advances in Mobile Learning Educational Research*, 3(1), 610–620. <https://doi.org/10.25082/amler.2023.01.010>
- Khoer, M., Mubarak, I., & Gifari, M. M. Al. (2021). Development of android-based learning media to improve student understanding in diesel motor courses. *Journal of Mechanical Engineering Education*, 8(2), 135–142.
- Miroshnychenko, I., & Massis, A. De.

- (2020). *Three decades of research on corporate governance and R&D investments: a systematic review and research agenda*. 5, 648–666. <https://doi.org/https://doi.org/10.1111/radm.12432>
- Muzaffar, A., Ragab Hassen, H., Lones, M. A., & Zantout, H. (2022). An in-depth review of machine learning based Android malware detection. *Computers and Security*, 121, 102833. <https://doi.org/10.1016/j.cose.2022.102833>
- Nurul, H. P., Amir, D., & Nadriyah, N. (2020). Pengembangan bahan ajar berbasis mind mapping pada pembelajaran ipa tema lingkungan sahabat kita. *Jurnal Tunas Bangsa*, 7(2), 204–218. <https://doi.org/10.46244/tunasbangsa.v7i2.1177>
- Pahlifi, D. M., & Fatharani, M. (2019). Android-based learning media on human respiratory system material for high school students. *Jurnal Inovasi Pendidikan IPA*, 5(1), 109–116. <https://doi.org/10.21831/jipi.v5i1.25111>
- Puspasari, R. (2019). Pengembangan buku ajar kompilasi teori graf dengan model addie. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, 3(1), 137. <https://doi.org/10.31331/medivesveteran.v3i1.702>
- Putri, K., Muchtar, Z., & Darmana, A. (2021). Develop an android-based learning media integrated with a scientific approach to the colligative solution's nature. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 4(1), 322–329. <https://doi.org/10.33258/birle.v4i1.1605>
- Şad, S. N., & Niyazi Özera. (2020). *Mobile or hostile? Using smartphones in learning English as a foreign language*. 35(5–6), 1031–1057. <https://doi.org/https://doi.org/10.1080/09588221.2020.1770292>
- Sadya, S. (2022). *Indonesia, raksasa teknologi digital asia*. <https://dataindonesia.id/digital/detail/pengguna-smartphone-indonesia-terbesar-keempat-dunia-pada-2022>
- Siahaan, K. W. A., Hisar, M. M., & Mungkap, M. S. (2021). Android-based learning media development strategies during pandemic times to improve student science literature. *International Journal of Education and Humanities*, 1(1), 34–42. <https://doi.org/10.58557/ijeh.v1i1.4>
- Silmi, M., & Rachmadyanti, P. (2018). Pengembangan media pembelajaran video animasi berbasis sparkol videoscribe tentang persiapan kemerdekaan ri sd kelas v. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, 6(4), 254987. <https://ejournal.unesa.ac.id/index.php/jurnal-penelitian-pgsd/article/download/23611/21586>
- Solikhin, F., & Wijanarko, A. (2021). The development of android-based learning media (chemdroid) on the topic thermochemistry to improve the students' achievement. *JKPK (Jurnal Kimia dan Pendidikan Kimia)*, 6(2), 138. <https://doi.org/10.20961/jkpk.v6i2.46849>
- Su, X., Zhang, D., Li, W., & Zhao, K. (2017). A deep learning approach to android malware feature learning and detection. *IEEE*, 68, 2295. <https://doi.org/10.1109/TrustCom.2016.0070>
- Sumadi, C. D., Hidayat, A., & Agustina, I. (2022). Literature study: Analysis of learning facilities in the pandemic era on the effectiveness of online Learning in Elementary School. *Widyagogik: Jurnal Pendidikan dan Pembelajaran Sekolah Dasar*,

- 9(2), 183–190.
<https://journal.trunojoyo.ac.id/widyagagik/article/view/13808>
- Supriadi, S., Idris, M. M., & Mustamin, M. (2020). Development of android based learning media on multimedia learning courses. *International Conference on Science and Advanced Technology (ICSAT)*, 0(0), 839–846.
- Tim EMS. (2015). *Pemrograman android dalam sehari*. Jakarta : Elex Media Komputindo, 2015.
- Ulfa, M., & Sucahyo, I. (2022). Development of hots-based e-modules using sigil applications on circular motion materials. *Jurnal Pendidikan Fisika*, 10(2), 130–143. <https://doi.org/10.26618/jpf.v10i2.7411>