**Letters in Information Technology Education (LITE)**
Vol 5, No 1, 2022, pp. 12-17
e-ISSN: 2654-5667

# Creative Problem-Solving Learning Media to Improve Students Learning Outcomes in Basic Graphic Design Subject

**Moh Yusril Firmansyah[a, 1,*], Syaad Patmanthara[a,2], Yohanes Gatot Sutapa[b,3]**
[a]Universitas Negeri Malang, Jl. Semarang No.5, Sumbersari, Kota Malang, 65145 Indonesia
[b]Universitas Tanjungpura, Pontianak, Indonesia, Jl. Prof. Dr. Hadari Nawawi, Kota Pontianak, 78124 Indonesia
[1]yusrilfirman23@gmail.com, [2]syaad.ft@um.ac.id, [3]yohanes.gatot.sutapa.y@fkip.untan.ac.id
*Corresponding author

**Article Info**

***Article history:***
Received: Jan 28, 2022
Revised: Feb 10, 2022
Accepted: Feb 25, 2022

***Keyword:***
Interactive Learning Media
Creative Problem Solving
Student Learning Outcomes
Basic Graphic Design

**ABSTRACT**

**Acceptance of information technology changes the paradigm through the internet network used on smartphones. The results of observations at SMKN 7 Malang with teachers of basic graphic design subject in class during the COVID-19 pandemic which were held remotely through their respective homes, that the use of conventional models and PowerPoint media used by teachers is less easy to explain basic lessons graphic design, the PowerPoint produced through the material presented are difficult to accept, and the use of media in learning activities that is not maximized to be able to motivate students to improve learning outcomes. This study aims to design interactive learning media based on graphic design with creative problem-solving content in improving student learning outcomes in class X TKJ. This study uses the ADDIE development research model and Waterfall. The test subjects of this study included material experts, media experts, and X TKJ students in SMKN 7 Malang. From the results of development research, this interactive learning media obtained an average score of media experts with a value of 92.78% and material experts with a value of 82.97%. Then from the small group trial with a value of 91.20%, and from the large group trial with a value of 80.37%. The effectiveness of the product is evidenced by the student's final post-test scores. In conclusion, creative problem-solving learning media content that was developed is very appropriate and effective for use in student learning activities at SMKN 7 Malang.**

## I. INTRODUCTION

One area that has a considerable influence on technological developments is the field of education, where teachers need to understand and use the tools available to achieve their educational goals. Every learning media that is increasingly sophisticated requires educational and learning information technology by reducing conventional learning to change it to modern methods, namely, through interactive learning which means two-way communication, or something that is active, interactive, relevant, and interacts with each other [1].

Technology and media can play a major role in learning. Technology is good for the world of education by providing good media and being able to adapt to the situations and conditions that are owned. If interactive learning media can be used as a learning aid that can encourage and foster student motivation and good learning materials are available and relevant to the current situation, it will be very helpful to support student learning outcomes independently. But now, the COVID-19 pandemic is sweeping the world in March 2020 which has resulted in learning being carried out remotely, educators are expected to be able to develop professionalism during the learning process, namely carrying out updates and innovations [2].

According to Karen, CPS is a model with an emphasis on problem solving skills, after that can lead to increased skills [3]. Meanwhile, according to Pepkin, Creative Problem Solving (CPS) is a model of learning and skills by providing solutions prioritizing the learning process carefully [4]. Hartantia supports this opinion, namely the CPS model encourages students to solve problems interactively, attracts students'

attention, and not be bored to continue studying the material provided [5].

Basic graphic design provides a learning curve for students to understand the basic theory and functions of the software used, one of which is bitmap image management software that can integrate the knowledge gained into a work collaboratively in heterogeneous groups. Material that provides theoretical and practical concepts makes it difficult for students to understand and has difficulties when applied to everyday life because the material cannot be seen and felt when observed. Therefore, students must wait for an explanation from the teacher.

Based on the results of observations and interviews with subject teachers, students encountered several obstacles in the conventional learning model in class X TKJ. Because learning is done remotely (online) which must be done at home during the COVID-19 pandemic. It is known that there are 60 students in class X TKJ or as much as 90% who use smartphones to communicate and learn. But mostly, students use smartphones to play games, social media such as WhatsApp, YouTube, Instagram, and only a few searches for information related to learning via Google. The use of smartphones themselves must be carried out under the supervision of parents so that students are safer to direct more towards positive content and not lead to negative content, because not all content that is spread on search sites or social media is age restricted. Therefore, student learning outcomes become late in mastering the material and few can take part in learning which results in the teacher needing to repeat the material used previously in learning until everyone understands.

The problem that often occurs with teachers and students is that the learning outcomes achieved by the teacher are less effective because the media used in the form of PowerPoint for the material delivered by the teacher is not easy to explain in basic graphic design subjects. PowerPoint is a software that is specifically used to make slides as presentations and has a weakness, namely there are still very limited teachers who are able to make media presentations which makes many teachers do not understand the meaning of the media used and students see that what the teacher conveys is correct so what students should be interested with teacher media but the impact is not interested. It turned out that the PowerPoint with the material presented were hard to accept and there were still lots of texts which made students slow to understand the material and got bored because the material presented was just mediocre. Most teachers do not understand the meaning of the media used and students see that what the teacher conveys is correct so students should be interested in the teacher's media but the impact is not due to the lack of attractiveness of PowerPoint media because the quality of the images, videos and animations is not very good and the media cannot carried everywhere. As stated by Devi Rusliawati, the problem of variations in models and learning media is theoretical learning material conveyed by the teacher does not display the actual situation and results in students getting bored with the appearance of the material presented and tending to be passive during the learning process so as to obtain basic interactive media conclusions CTL loaded graphic design.

From the results of the research above, so that students are very interested in learning and not fixated on PowerPoint media that satisfies when the teacher explains, it is necessary to develop interactive learning media that students like with creative problem-solving content that can increase attractiveness, learning outcomes, and product effectiveness. Most students have their smartphone as a device to use in their daily activities to provide interesting learning opportunities.

Based on the background and explanation above, the objectives of this development research are (1) to develop interactive learning media products with creative problem solving content in basic graphic design subjects (2) to produce creative problem solving learning media products that are valid and suitable for use according to material experts, media experts, and users; and (3) knowing the effectiveness of android-based products which is known through the final score of the post-test carried out by students while reading the material and working on the questions that have been provided in the basic subject of graphic design.

## II. METHOD

The method used in this research and development is a general method of system research and development, namely the Software Development Life Cycle (SDLC). Besides being able to be used to develop products in the form of media, the ADDIE research model can also be used to develop other products such as learning methods and teaching materials [6]. The steps for developing learning media with the ADDIE model according to Branch [7] are shown in Fig. 1.

According to Branch, ADDIE is suitable for effective use in the development of a learning product and research in learning [7]. Researchers use the ADDIE development model which includes five stages, namely: Analyze, Design, Development, Implementation, and Evaluate. There are several reasons for choosing the ADDIE model, including: (1) This model is simple; (2) Easy to understand; (3) Provides an opportunity to carry out an evaluation; and (4) revisions that always exist in every phase that is passed. So that the resulting product can make a valid and reliable product.

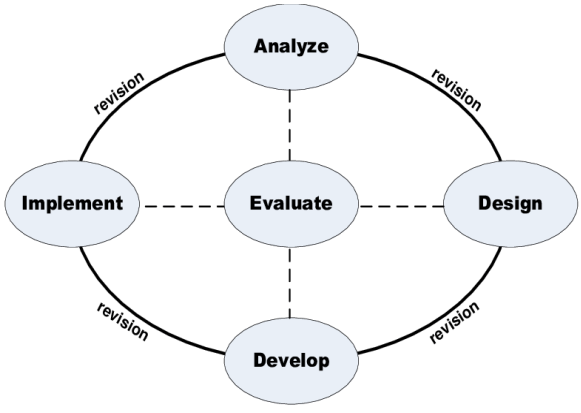


Fig. 1. ADDIE Development Model [7]

After the product has been developed, the interactive learning media product in the form of an android application will go through a validation process by material experts and media experts. There were 2 material experts who did the validation from the Electrical Engineering lecturer at State University of Malang and the SMKN 7 Malang teacher who taught Basic Graphic Design subjects. Then for media expert validation it was carried out by a lecturer majoring in Electrical Engineering, State University of Malang. Material experts and media experts are given a validation questionnaire where the results of filling out the questionnaire will be managed based on a formula or equation adapted from Akbar and Sriwiyana [8]. Product validity data analysis is obtained through the following formula:

$$Vm = \frac{TSe}{TSh} x\ 100\% \quad (1)$$

$$Vd = \frac{TSe}{TSh}\ x\ 100\% \quad (2)$$

$$Vt = \frac{Vm+Vd}{2} = \cdots \% \quad (3)$$

Explanation:
Vm : Material validation
Vd : Media design validation
Tse : Total empirical validator score
Tsh : Expected total score.
Vt : Product total validation
Where 100% is a constant.

After processing the data and obtaining the results of learning media validation, improvements or revisions will be made to the products developed. The product improvement refers to the media validation criteria adapted from Akbar and Sriwiyana [8] which are shown in Table 1.

Then the product is declared effective if the score individually is above the KKM by reaching 85% of the number of students who get the best score in accordance with (KKM). The value of each student's learning outcomes is calculated using the formula adapted from Arikunto [9] as follows:

$$Final\ Score = \frac{Total\ Gain\ Score}{Total\ Maximum\ Score}\ x\ 100\% \quad (4)$$

To measure the level of effectiveness of the product through the results of the final score that has been done through interactive learning media, MDGraphics uses the completeness percentage formula adapted from Arikunto [9] as follows:

$$Final\ Score = \frac{Total\ students\ who\ obtained \geq 75}{Total\ students}\ x\ 100\% \quad (5)$$

Then the learning outcome data is then calculated and converted to obtain the effectiveness level of the product that has been developed so that the media is able to achieve student learning goals properly which is adapted from adapted from Riduwan [10] which is shown in Table 2.

## III. Result and Discussion

After product development, an interactive learning media product was produced as a support for the Basic Graphic Design subject in the Computer Engineering and Informatics Expertise Program. This interactive learning media contains the material presented, namely: (1) Bitmap image processing software, (2) Various types of bitmap images; (3) Featured Features; (4) Processing bitmap images with software; (e) Benefits of bitmap image manipulation; (f) Techniques for manipulating bitmap images. Learning media that has been developed can be seen in Figure 2-4.

Table 1. Product Validity Level Criteria

| No | Criterias | | Validity Level |
|---|---|---|---|
| 1 | 75,01% - 100,00 % | | Very valid (can be used without revision) |
| 2 | 50,01% 75,00% | - | Valid enough (can be used with minor revision) |
| 3 | 25,01% 50,00% | - | Invalid (unusable) |
| 4 | 00,00% 25,00% | - | Strongly invalid (forbidden to use) |

Table 2. Product Effectiveness Level Criteria

| No | Criterias | Effectiveness Level |
|---|---|---|
| 1 | 81% - 100% | Very effective |
| 2 | 61% - 80% | Effective |
| 3 | 41% - 60% | Effective enough |
| 4 | 21% - 40% | Less effective |
| 5 | 1% - 20% | Ineffective |

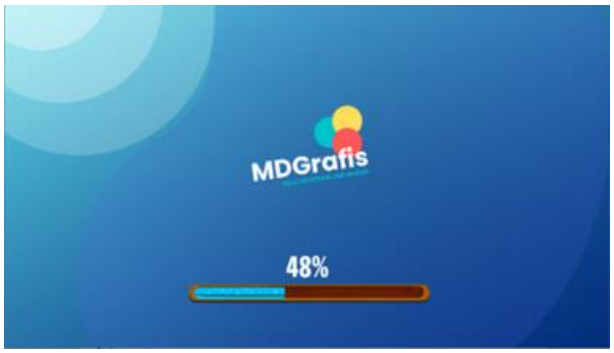


Fig 1. Splash Screen Interface


Fig 2. Game Control Interface


Fig 3. Material Interface

The developed Android interactive learning media is named "MDGrafis – Learning Design Made Easy". This application will run well on Android smartphones using the following minimum specifications: (1) Minimum OS Android OS, v5.0 (Lollipop); (2) Minimum processor Mediatek MT6795 Helio X10, Octa-core 2.0 GHz; (3) PowerVR G6200 GPUs; (4) 16GB & 32GB ROMs; and (5) 5 inches screen, minimum screen resolution of 720 x 1280 pixels.

*1. Test Results*

After product development, the next step is validation by media experts and material experts. Media expert validation was carried out by competent lecturers according to the research topic from the Department of Electrical Engineering, State University of Malang. After trying and using this interactive learning media, the media expert filled out the validation questionnaire that was previously given, then the data was obtained as in Table 3.

Based on the data shown in Table 3, the validation results from media experts are categorized as very valid. This happens because the average value of all aspects is 92.78%. Individually, if it is translated into aspects of software engineering, it gets a validity value of 87.72% with very valid criteria, the visual communication aspect gets a validity value of 90.62% with very valid criteria, and the usability aspect gets a validity value of 100% with very valid criteria. This already meets the criteria for interactive learning media according to Wahono in terms of being effective, efficient, reliable, and easy to maintain [11].

Furthermore, validation from material experts was carried out by 2 validators. The first material expert validator was conducted by competent lecturers according to the research topic from the Department of Electrical Engineering, State University of Malang. While the second material expert validator was carried out by teachers of the Basic Graphic Design subject at SMK Negeri 7 Malang. Based on the overall data processing formula and by adjusting the validity percentage according to Table 1, the overall data obtained by the two validators is as shown in Table 4.

Based on the data shown in Table 4, the validation results from material experts are categorized as very valid. This happens because the average value of all aspects is 82.97%. Individually, if it is translated into the feasibility aspect of the material, it gets a validity value of 85% with very valid criteria, the learning design aspect gets a validity value of 84.38% with very valid criteria, the visual communication aspect gets a validity value of 75% with quite valid criteria, and aspects of language feasibility get a validity value of 88%.

Based on the data shown in Table 5, the total product validation results with the percentage of each media expert validation results with a percentage of 92.78% with very valid criteria and the results of material expert validation with a percentage of 82.97% with very valid criteria. Then after validation from the two experts has been found, it can be obtained using the above formula from Akbar and Sriwiyana [8], namely the average total acquisition gets a percentage of 87.88% with very valid criteria. So, it can be concluded that the two validity can continue to try out into small and large groups in Class X TKJ SMKN 7 Malang.

Based on the data shown in Table 6, the results of the trials conducted by small groups were categorized as very feasible. This happens because the average value of all aspects is 91.20%. Some test subjects from small groups argue that this learning media can foster student learning motivation. This statement is reinforced by Patmanthara that the use of learning media through digital devices, namely smartphones, can process them into knowledge in everyday life [12].

TABLE 3. MEDIA EXPERT VALIDATION RESULT DATA

| No | Aspect | Evaluation | | Validity (%) | Criteria |
|---|---|---|---|---|---|
| | | Tse | Tsh | | |
| 1 | Software engineering | 43 | 44 | 87,72% | Very valid |
| 2 | Visual communication | 30 | 32 | 90,62% | Very valid |
| 3 | Usefulness | 12 | 12 | 100% | Very valid |
| Total | | 83 | 80 | | |
| Average | | | | 92,78% | Very valid |

TABLE 4. MATERIAL EXPERT VALIDATION RESULT DATA

| No | Aspect | Evaluation | | Validity (%) | Criteria |
|---|---|---|---|---|---|
| | | Tse | Tsh | | |
| 1 | Material eligibility | 34 | 40 | 85% | Very valid |
| 2 | Learning design | 54 | 64 | 84,38% | Very valid |
| 3 | Visual communication | 30 | 40 | 75% | Valid enough |
| 4 | Language eligibility | 14 | 16 | 88% | Very valid |
| Total | | 132 | 160 | | |
| Average | | | | 82,97% | Very valid |

TABLE 5. TOTAL PRODUCT VALIDATION RESULT DATA

| No | Validation | Vt (%) | Criteria |
|---|---|---|---|
| 1 | Media Expert | 92,78% | Very valid |
| 2 | Material Expert | 82,97% | Very valid |
| Total Average | | 87,88% | Very valid |

TABLE 6. SMALL GROUP TRIAL RESULTS DATA

| No | Aspect | Evaluation | | Validity (%) | Criteria |
|---|---|---|---|---|---|
| | | Tse | Tsh | | |
| 1 | Software engineering | 119 | 128 | 92,97% | Very valid |
| 2 | Learning design | 145 | 160 | 90,63% | Very valid |
| 3 | Visual communication | 86 | 96 | 89,58% | Valid enough |
| 4 | Attractiveness | 119 | 128 | 92,97% | Very valid |
| 5 | Usefulness | 115 | 128 | 89,84% | Very valid |
| Total | | 584 | 640 | | |
| Average | | | | 91,20% | Very valid |

TABLE 7. LARGE GROUP TRIAL RESULTS DATA

| No | Aspect | Evaluation | | Validity (%) | Criteria |
|---|---|---|---|---|---|
| | | Tse | Tsh | | |
| 1 | Software engineering | 439 | 528 | 83,14% | Very valid |
| 2 | Learning design | 549 | 660 | 83,13% | Very valid |
| 3 | Visual communication | 311 | 396 | 78,54% | Valid enough |
| 4 | Attractiveness | 430 | 528 | 81,44% | Very valid |
| 5 | Usefulness | 399 | 528 | 75,57% | Very valid |
| Total | | 2128 | 2640 | | |
| Average | | | | 80,37% | Very valid |

TABLE 8. PRODUCT EFFECTIVENESS LEVEL DATA

| No | Aspects of completeness | Class X TKJ |
|---|---|---|
| 1 | Number of students completed | 29 |
| 2 | Percentage of students who complete | 87,88% |
| 3 | The number of students is not complete | 4 |
| 4 | Percentage of students incomplete | 12,12% |

The second stage of the user trial was a large group trial conducted by 32 students of class X TKJ SMKN 7 Malang. After experimenting with the use of interactive learning media on large group users, the trial data obtained is shown in Table 7.

Based on the data shown in Table 7, the results of trials conducted by large groups were categorized as very feasible. This happens because the average value of all aspects is 80.37%. This statement is reinforced by Patmanthara that the use of learning media through digital device aids, namely smartphones, can process them into knowledge in everyday life [13]. In addition, the research results of Pramuaji, A. & Munir, M., Sukmadewa, Y.A., and Putro, N.W. stated that tools for learning media using smartphones can facilitate the student learning process [14]–[16].

Based on the results of the evaluation of the level of product effectiveness in Table 8, it can be concluded that the learning outcomes in the cognitive domain of each student can be seen with the completeness limits or KKM set by the school. The KKM set for the Basic Graphic Design subject is 75. This figure is compared to the learning outcomes obtained by individual students. So, it can be concluded that the effectiveness of the product with an average percentage of success obtained by students individually is 87.88% with effective criteria. This figure indicates that the use of interactive MD-graphic learning media implemented in class X TKJ SMKN 7 Malang is used to improve optimal student learning outcomes in the cognitive domain because the overall average score of students obtained is above the KKM by achieving 85% or 75 of the grades that have been determined. Shows that students can produce very good grades and in accordance with predetermined conditions. This statement is reinforced by Pujiono, E., Putro, N.W., Anggraeni, A.P. that the use of learning media via computers or mobile can provide benefits and high motivation for students to obtain better learning outcomes [16]–[18].

## IV. CONCLUSIONS

Based on these results and development, learning media is produced in the form of interactive learning media with creative problem solving content to improve student learning outcomes as a support for the Basic Graphic Design subject in the Computer Engineering and Informatics Expertise Program. The material contained in interactive learning media is: (1) The resulting product is in the form of interactive learning media with creative problem solving called MD-Graphics which supports and is used as an alternative learning as evidenced by the validation carried out by media experts showing a percentage of 92.78% with very high criteria. valid and the percentage of validity from material experts obtained a percentage of 82.97% with very valid criteria as a learning resource that can help motivate students; (2) Interactive learning media can be downloaded at the Google Play Store (3) This product is an interactive learning media that can be accessed via a smartphone and can be used anywhere and anytime and; (4) Interactive learning media is very useful for use as evidence of the feasibility and effectiveness trials as a learning resource can help motivate students of class X TKJ at SMKN 7 Malang to continue learning. This statement is corroborated by data taken from small group trials and large group trials. In the small group trial, a percentage of 91.20% was obtained and was declared very feasible. Not far from the previous results, the results of processing trial data for large groups obtained a percentage of 80.37% and was declared very feasible and the effectiveness of the product on learning outcomes obtained a percentage of 78.86%. Based on this assessment, interactive learning media with creative MD-Graphical problem-solving content developed is very feasible and effective for use in student learning activities at SMK Negeri 7 Malang.

Based on the research and development results that have been passed, there are several suggestions that can make interactive learning media better:

It is necessary to upgrade the software so that the media performance is better, there are many plugins available, and there are no more bugs or errors when running the application.

It is necessary to add a question discussion feature at the end of students working on all the questions so that students are more motivated and more enthusiastic about improving their learning outcomes.

Interactive learning media tools need to be developed for the iOS operating system.

## REFERENCES


1. B. Warsita, Teknologi Pembelajaran Landasan & Aplikasinya. Jakarta: Rineka Cipta, 2008.
2. N. Amirudin, "Problematika Pembelajaran Pendidikan Agama Islam di Era Digital," in Prosiding Seminar Nasional PAI dengan Pendekatan Multidisipliner, 2019.
3. E. P. Dewi, "Pengaruh Penerapan Model Pembelajaran Creative Problem Solving (CPS) dalam Pembelajaran Matematika terhadap Kemampuan Penalaran Adaptif Matematika Siswa SMA," Universitas Pendidikan Indonesia, 2008.
4. K. L. Pepkin, "Creative Problem Solving in Math." http://www.uh.edu/hti/cu/2004/v02/04.htmfl (accessed Jan. 20, 2020).
5. Hartantia, "Penerapan Model Creative Problem Solving (CPS) untuk Meningkatkan Minat dan Hasil Belajar Kimia pada Materi Pokok Termokimia Siswa Kelas XI. IA2 SMA Negeri Colomadu Tahun Pelajaran 2012/2013," Jurnal Pendidikan Kimia (JPK), vol. 2, no. 2, 2013, [Online].
6. S. Patmanthara, Komputer Dalam Pembelajaran. Jember: Cerdas Ulet Kreatif, 2014.
7. R. M. Branch, Instructional Design: The ADDIE Approach. Department of Educational Psychology and Instructional Technology University of Georgia. USA: Springer, 2009.
8. S. Akbar and H. Sriwiyana, Pengembangan Kurikulum dan Pembelajaran Ilmu Pengetahuan Sosial (IPS). Yogyakarta: Cipta Media, 2010.
9. S. Arikunto, Dasar-Dasar Evaluasi Pendidikan. Jakarta: Bumi Aksara, 2012.
10. Riduwan, Skala Pengukuran Variabel-Variabel Penelitian. Bandung: Alfabeta, 2013.
11. R. M. Wahono, "Aspek dan Kriteria Media Pembelajaran," 2006. https://romisatriawahono.net/2006/06/21/aspek-dan-kriteria-penilaian-media-pembelajaran/ (accessed Jul. 26, 2021).
12. S. Patmanthara and W. N. Hidayat, "Improving Vocational High School Students Digital Literacy Skill through Blended Learning Model," J Phys Conf Ser, vol. 1028, p. 012076, Jun. 2018, doi: 10.1088/1742-6596/1028/1/012076.
13. Nashiroh, P. K., Kamdi, W., & Elmunsyah, H. (2017). The effectiveness of web-programming module based on scientific approach to train logical thinking ability for students in vocational high school. AIP Conference Proceedings, 1887. https://doi.org/10.1063/1.5003551
14. A. Pramuaji and M. Munir, "Pengembangan Media Pembelajaran Interaktif pada Materi Pengenalan Corel Draw sebagai sarana Pembelajaran Desain Grafis di SMK Muhammadiyah 2 Klaten Utara," Elinvo (Electronics, Informatics, and Vocational Education), vol. 2, no. 2, 2017, [Online]. Available: https://journal.uny.ac.id/index.php/elinvo/article/viewFile/17312/10081
15. Y. A. Sukmadewa, "Pengembangan Media Pembelajaran Segitiga Exposure Berbasis Desktop Untuk Pembelajaran Desain Grafis Percetakan Bermuatan Creative Problem Solving pada Siswa Kelas XI Multimedia Di SMK Negeri 10 Malang," Universitas Negeri Malang, 2019.
16. N. W. Putro, "Pengembangan Media Komik Digital Interaktif (MITA) untuk Meningkatkan Hasil Belajar terhadap Materi Kedatangan Bangsa Eropa di Nusantara pada Kelas X Perbankan 2 SMKN 2 Boyolangu Tulungagung," Universitas Negeri Malang, 2019.
17. E. Pujiono, "Media Pembelajaran Interaktif Berbasis Construct 2 pada Mata Pelajaran Sejarah Indonesia Materi Hindu Budha untuk SMA Negeri 1 Semarang Kelas X," JP3 (Jurnal Pendidikan dan Profesi Pendidik), vol. 3, no. 1, Mar. 2018, doi: 10.26877/jp3.v3i1.2204.
18. A. P. Anggraeni, "Pengembangan Bahan Ajar Digital Komposisi Digital Bermuatan Creative Problem Solving (CPS) untuk Menumbuhkan Keaktifan Siswa Kelas XI Program Keahlian Multimedia di SMK Negeri 5 Malang," Universitas Negeri Malang, 2018.