The development of learning media based on *Yu-Gi-Oh Physics Smart Card* (YOPSA) to increase learning interest of student on the static fluid material

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**Abstract.** The aims of this study were to produce learning media based on Yu Gi Oh Physics Smart Card (YOPSA) in order to increase students’ interest learning in static fluid material of grade X Vocational High School of 1 Semarang as well as to find out the enhancement of the interest in learning physics of the students who take the part in YOPSA learning media. This study was a Research and Development (R&D) with a 4-D model (define, design, develop, and disseminate). The results of this research showed that the developed product of *Yu Gi Oh Physics-based Smart Card* (YOPSA) learning media was suitable to according to the assessment by the expert lecturers and physics, and the average results from students score is 3.77 (very good). Otherwise, the *Yu Gi Oh Physics Smart Card* (YOPSA) learning media was able to increase students’ interest in learning physics with gain value 0.40 (medium).

**1. Introduction**

Education in Indonesia currently uses the 2013 curriculum. The learning is a student-centered approach, so that the teachers s a facilitator. The teachers are required to be able to choose and use the media which suitable with their needs. One example is through a game.

Game as a one of the learning media has often been used, it is proven by the number of studies that examine the use of game as media in learning, for example, card games [1] which said that learning using cards has many benefits than Traditional learning (lectures), besides being fun, card games can also be played from middle level of school until postgraduate level. Used game as a media to attract students’ interest in learning [2-3]. In physics subject of vocational school, there is one of the main subjects in grade X namely static fluid. In static fluid, there are concepts and formulas that must be understood and memorized. Inevitably, the material of static fluid is not only learned the theory, but also practice what they do consciously or not is sometimes related to static fluid. The lack of attractive learning media greatly affects the students’ interest and learning outcomes, especially for vocational students, because what is needed here is a fun learning without leaving the purpose of learning.

To help students understand the concepts and formulas of static fluid material in ease and fun way, the researchers chose Yu Gi Oh Physics Smart Card (YOPSA) as the learning media. The cards come from Japan, it is must be played with the right strategy, so it can trigger student motivation in learning. So far, learning using the YOPSA has not been implemented at SMK Negeri 1 Semarang. Another advantages of the YOPSA are easy to play, compact and easy to carry anywhere. The lack of this media
is easy to be lost because the card size is small, and it easily broken like other cards but can be anticipated by laminated the card.

Based on the background of the problem above, a research was carried out on the development of YOPSA as a learning media for physics on Static Fluid material to increase the interest and learning outcomes of grade X students of SMK Negeri 1 Semarang. The objectives of this study are: (1) to produce learning media based on physics smart cards that are suitable to increase students’ interest and learning outcomes of grade X SMK Negeri 1 Semarang in static fluid material, (2) to investigate the increase of the interest in learning physics of students who take part in learning with YOPSA, (3) to know the increase of physics learning outcomes for students who take learning with learning media based on YOPSA.

2. Methods

This research is a development research (R&D) with a 4-D model (Four D Models) [4] which consists of (1) define, (2) design, (3) develop, (4) dissemination. The stages of this research are presented in the schematic shown in Figure 1.

The subjects of the research were students of grade X Technical Light Vehicle (TLV) 3 at SMK Negeri 1 Semarang. The data were collected from February to March 2020 at SMK Negeri 1 Semarang. The reasons for choosing the research location were: (1) according to the characteristics of the students, (2) the willingness of the school to become the center of research implementation. [5]

The research instruments used in this study were as follows: (1) Assessment sheets of instructional media by expert lecturers and physics teacher grade X SMK Negeri 1 Semarang., (2) The learning device is in the form of learning media based on Yu Gi Oh Physics Smart Card (YOPSA) and Lesson Plan, (3) Questionnaire students’ interest in learning physics, (4) Questionnaire student responses.

The data validation of the research instrument in the form of questionnaire validation of student learning interest obtained from the validator, analyzed using the Content Validity Ratio (CVR) and Content Validity Index (CVI).
Table 1. Validator assessment criteria

| Criteria      | Score | Index |
|---------------|-------|-------|
| Not good      | 1     | 1     |
| Poor          | 2     |       |
| Good          | 3     | 2     |
| Very good     | 4     |       |

How to calculate the value of the Content Validity Ratio (CVR) is using the equation:

\[
CVR = \frac{N_e - N}{\frac{N}{2}}
\]

With:
- \(N_e\) : number of validators who agreed
- \(N\) : total number of validators

With the following conditions: (1) when the number of validators who agree is less than half of the total validators, the CVR is negative, (2) when the number of validators who agree is half of the total number of validators, the CVR is zero, (3) when all validators agree, the CVR is 1 (set to 0.99), (4) when the number of validators who agree is more than half of the total validators, the CVR is between 0 - 0.99. CVI is the average CVR value of all validation questionnaire items. To calculate the CVI validity index value using the equation.

\[
CVI = \frac{\text{total of CVR}}{\text{number of questioner items}}
\]

The reliability analysis based on YOPSA learning media was determined using the Percentage of Agreement. The value of reliability can be determined using the following equation [6].

\[
PA = \left(1 - \frac{A - B}{A + B}\right) \times 100\%
\]

with PA is the Percentage of Agreement. A is the higher total assessor score and B is the lower total assessor score. Based on the value of Percentage of Agreement ≥ 75%, so the product is declared reliable.

SBi feasibility analysis used to analyze the results of validation by expert lecturers and grade X physics teachers for learning media based on YOPSA, as well as student responses to the media developed. In Table 2, the guidelines for the rating of 4 scale instrument is presented.

Table 2. Guidelines for instrument rating scale

| Quantitative Data | Score |
|-------------------|-------|
| Bad               | 1     |
| Poor              | 2     |
| Good              | 3     |
| Very good         | 4     |

After the questionnaire was changed to a 4 scale, then the average score was calculated. The average score is converted into a qualitative value with the score range assessment calculation criteria as shown in Table 3.

Table 3. Assessment of instrument results with calculated score ranges

| Value | Score Range | Category |
|-------|-------------|----------|
| 4     | \(\bar{X} \geq \bar{X}_1 + SBi\) | Very Good |
| 3     | \(\bar{X}_1 + 1SBi > \bar{X} \geq \bar{X}_1\) | Good |
| 2     | \(\bar{X}_1 > \bar{X} \geq \bar{X}_1 - 1SBi\) | Poor |
| 1     | \(\bar{X} < \bar{X}_1 - 1SBi\) | Bad |
The standard gain analysis used to determine the increase of student interest in learning before and after using YOPSA learning media [7]:

\[
\langle g \rangle = \frac{\text{posttest score} - \text{pretest score}}{\text{maximum score} - \text{pretest score}}
\]

The interpretation of the gain value is presented in the criteria in Table 4.

| \( \langle g \rangle \) Value | Criteria |
|-----------------------------|----------|
| \( \langle g \rangle \geq 0.7 \) | High     |
| \( 0.7 > \langle g \rangle \geq 0.3 \) | Medium   |
| \( \langle g \rangle < 0.3 \) | Low      |

3. Results and Discussion

3.1. The define stage (definition)

The results of the observations at SMK Negeri 1 Semarang, the curriculum used is the 2013 curriculum. The learning material used in Yu Gi Oh Physics Smart Card (YOPSA) learning media is Static Fluid said that choosing a game media for appropriate learning activities can bring a positive effect or impact on the students themselves [8-9].

3.2. Design stage (planning)

At this stage, compiling a research instrument in the form of a validation sheet for the developed media for expert lecturers and physics teachers of grade X SMK Negeri 1 Semarang, student response questionnaires to the developed media, students' physics learning interest questionnaire, and student physics learning interest questionnaire validation sheet for expert lecturers and physics subject teachers for class X SMK Negeri 1 Semarang. educational games can make students motivated and have a positive impact on students or those who play it [10-12].

Yu Gi Oh was originally a manga card (Japanese comic) created by Kazuki Takahashi. During its development, Yu-Gi-Oh has been developed into television shows, video games, and anime. Yu-Gi-Oh is a strategy game that is quite fun and interesting to play for all people (as long as you understand how to play it). Figure 2 shows a picture of a set of Yu Gi Oh Physics Smart Card (YOPSA) games.

In this card, there is a short formula in the answer card which intended to stimulate student focus in working on the problem. This card provides an opportunity for students to participate actively, with this media students are invited to carry out activities, including: discussion, guessing answers, and expressing opinions, so that students will be more relaxed in learning physics and expected to have a positive effect on student interest in learning. In Figures 2 and 3 are a set of YOPSA games and how to play them.
Figure 2. A set of YOPSA games

Figure 3. YOPSA game rules

THE RULES FOR PLAYING YOPSA ARE AS FOLLOWS:

1. The total of YOPSA cards are 42 with 21 answer cards (with the different color for each group) and 21 question cards (100 points for red cards, 200 for orange cards, 300 for green cards).
2. The game is played in groups with 5-6 students in each group.
3. Each group sends one representative come front to take the question cards and read the questions.
4. Each group has a chance to throw the question.
5. If a question is thrown, the designated group is allowed to answer first. If not being thrown, the first group to take the card will have the chance to answer first.
6. If the group that gets the question cannot answer, the other group may take the chance by placing a card on the question card on the tournament board.
7. If the group that get the thrown card is correct then the points will be fully owned by the group, if it is not correct then the points will still be owned by the thrower group the question even though they do not answer, if the other group is correct then the points will be halved with the thrower group.
8. The correct group must follow the instructions on the card.
9. The answers will be corrected together with the teacher as the guide of the game.
10. The game ends when the questions run out or the lesson time is over.
11. The group with the highest points will get a reward.
3.3. Develop stage (development)
This stage aims to produce a development product, then validated by expert lecturers and physics teacher of grade X SMK Negeri 1 Semarang. After being validated then being analyzed and revised, a small trial will be carried out, being revised again as Revision II. The results of the Revision II then tested widely and produced the final product.

The feasibility of Yu Gi Oh Physics Smart Card (YOPSA) as a learning media based on the results of validation by validators and analyzed using SBi, obtained an average value of all aspects of 3.84 included on a very good quality, so it is feasible to be used as a learning media. Meanwhile, the feasibility of learning media based on Yu Gi Oh Physics Smart Card (YOPSA) from the results of student responses has an average score of 3.77 with a very good category.

The feasibility of the lesson plan based on the validator's assessment was analyzed by using SBi analysis. The analysis results from 8 aspects of the assessment had an average value of all aspects of 3.79. Based on the results, it is known that ≥ 3.0 is in accordance with the SBi assessment category, so it included in the very good category and the lesson plans made are feasible to use.

The validator assessment for the student learning interest questionnaire was based on 2 aspects, namely the content aspect and the language aspect. Analysis of the validation of the student interest in learning questionnaire using CVR and CVI. For the CVR value for both aspects of 0.9 and the CVI value of 0.9 [11], the CVI value falls into the very good category.

The reliability of learning media based on YOPSA was carried out after validation by expert lecturers and physics teachers of grade X SMK Negeri 1 Semarang. Based on the results of data analysis, the value of the Percentage of Agreement (PA) for learning media based on YOPSA is 97.78%, so the product said to be reliable and can be used as a learning media [12-13].

The value of students' interest in learning physics was obtained from a questionnaire on student interest in learning before and after using Yu Gi Oh Physics Smart Card (YOPSA) learning media on the aspects of student pleasure, aspects of student interest, aspects of student attention and aspects of student involvement. Interest in learning physics in field trials has increased based on an average of all aspects of 0.40 with a gain value of 0.40.

Based on Table 4, students' interest in learning in field trials falls into the medium category. Game as a media greatly motivates students in learning, with the increase of the motivation is definitely in accordance with the increase of student interest in learning [14-15]. In Figure 4, a graph is presented the increase of student interest in learning in the field trials. Game as a media is very appropriate to arouse students' enthusiasm and motivation in learning.

![Figure 4. The increase of student interest in learning at the field trial](image-url)
3.4. Disseminate stage (spread)
At this stage the researchers distributed the result of the research by giving Yu Gi Oh Physics Smart Card (YOPSA) media to the physics teacher of grade X at SMK Negeri 1 Semarang and publishing them in the e-journal of the Physics Education Department, FMIPA UNNES.

4. Conclusion
Based on the results of the data analysis, it is concluded that The product of the Yu Gi Oh Physics Smart Card (YOPSA) learning media that being developed is suitable to increase students’ interest in learning physics in grade X SMK N 1 Semarang based on the assessment of expert lecturers and physics teachers. The X grade of SMK N 1 Semarang has an average score of 3.84 with the category of very good quality, and the results of students’ responses in the value of 3.77 (very good). The YOPSA learning media on static fluid material can increase students' interest in learning physics in Field trials with a gain value of 0.40 which included in the medium category. There are several suggestions for the improvement and development of the next research. Based on the results of this study, it is suggested: In further research related to the game YOPSA, it is expected to pay more attention to time. In the next study of the YOPSA learning media, it is hoped that it can be developed for other physics materials. In the next study of the YOPSA learning media, it is hoped that it will be developed for other learning methods.

References
[1] Al-Azawi R., Al-Faliti F and Al-Blushi M. 2016 Int. J. Innov. Manag. Technol. 7(4) 132
[2] Aziz R, Norman H, Nordin N, Wahid F N and Tahir N A 2019 Creat. Educ. 10(12) 3175
[3] Vargianniti I and Karpouzis K 2019 International Conference on Games and Learning Alliance (Cham: Springer) p 332
[4] Thiagarajan S, Semmel D S and Semmel M I 1974. Instructial Development For Training Teachers Of Exceptional Children (Bloomington: Central For Innovation On Teaching The Handicapped)
[5] Budiningsih C A 2013 J. Cakrawala Pendidik 1(1) 160
[6] Borich G D 1994. Observation Skills for Effective Teaching (New York: Merrill)
[7] Hake R R 1999 Analyzing Change/Gain Score. (Woodland Hills: Dept. Of Physics, Indiana Universit)
[8] Aleksic V 2016 Proc. 17th Int. Conf. Comput. Syst. Technol. 2016 53(3) p 355
[9] Limantoro S W 2018 PUPIL: Int. J. Teach. Educ. Learn. 2(3) 38
[10] Lestari R 2018 Pengembangan Media Pembelajaran Kartu Pintar pada Mata Pelajaran Sejarah Kebudayaan Islam Materi Wali Songo di Mts Bahrul ‘Ulum Sudimoro Kecamatan Semaka Kabupaten Tanggamus (Doctoral dissertation UIN Raden Intan Lampung)
[11] Rowley J, Jones R, Vassiliai M and Hanna S 2012 Int. j. Mark. Res. 54(1) 93
[12] Liu E Z F and Chen P 2013 Procedia-Soc. Behav. Sci. 103 1044
[13] Harwinanda R 2018 Pedagogi: J. Ilmu Pendidik. 18(2) 101
[14] Taspinar B, Schmidt W and Schuhbauer H 2016 Procedia Comput. Sci. 99 101
[15] Spandler C 2016 J. Geosci. Educ. 64(2) 108