Instrument analysis of the effect of project-based learning models on learning outcomes on the basic competencies of commercial hair trimming

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A B S T R A C T

This study was used to determine the feasibility of the instruments before being used for further research. This study calculates the results of the validation of three validators who are experts in their fields using arithmetic averages, the validated instruments are: (1) the syllabus gets a score of 92.67%; (2) Learning Implementation Plan (RPP) scored 94.4%; (3) The Knowledge Assessment Instrument received a score of 93.36%; (4) The skill assessment instrument got a score of 93.31%; (5) The attitude assessment instrument got a score of 96.89%; (6) The Project Based Learning module received a score of 93.1%. In addition, this study also calculates the validity of the items, the differentiability of the items, the level of difficulty of the items and the reliability test of the items. This question consists of 30 items that have been tested on 15 students to find out the results of the calculation: (7) the validity of the items obtained a significance level value (α) 0.05; (8) the level of difficulty of the items obtained a percentage of 16.67 for the easy question category, 70% for the medium question category, and 13.33% for the difficult question category; (9) The differentiating power of the items has very good criteria; and (10) the reliability of the items got a score of 0.753. From the calculation results that have been mentioned, it can be stated that the instrument of the influence of project-based learning models on learning outcomes on the basic competencies of commercial hair trimming is declared feasible and can be used for further research.

INTRODUCTION

Indonesia is one of the developing countries in the world, and Indonesia always strives to become one of the developed countries. Efforts are being made to make Indonesia a developed country by improving the quality of the nation's education, by making small changes made by all education stakeholders. This small change was conveyed by the Minister of Education and Culture regarding the policy of equal distribution of Human Resources (HR), namely the number of teachers, teacher quality and resources. In addition, the Minister of Education and Culture provides a program on revitalization for Vocational High Schools (SMK). This is in accordance with the mandate of Presidential Instruction (Inpres) Number 9 of 2016 concerning Vocational Revitalization.

Vocational High School (SMK) is a vocational education level that has several majors whose graduates are expected to be ready to work in Industry and the Business World (IDUKA) as according to (Khairina et al., 2016). One of the

majors at the SMK level are the Department of Skin and Hair Beauty. In this department, students are expected to be able to master several competencies, which are expected to be provisions for the future of students. This competency can be used to work in industry or entrepreneurship and can even be used to continue education to a higher level.

In Industry and Business (IDUKA) a workforce is required to synergize with the team or independently, responsibly and disciplined. Therefore, education in Vocational High Schools (SMK) must produce students who are ready to work in industry. To make students become disciplined, responsible, creative and able to work with teams or independently, teachers are required to play an active role and can provide creative, innovative, disciplined and responsible learning methods and be able to face problems in the real world. One of the innovative, creative, disciplined learning models that also requires students to work in teams and independently is the Project-Based Lea-

rning Model. Project-Based Learning Model is one of the authentic learning models whose steps can train students' abilities and skills to plan, implement and evaluate projects in the real world so as to facilitate students to think creatively and make innovations (Afifi & Yulisma, 2020) Meanwhile, according to (Kuswandi et al., 2018) Project-based learning model is a learning model that emphasizes students to understand concepts, principles, investigative decisions and represent products. This model is an appropriate learning method used in various sciences to improve thinking skills.

By applying the project-based learning model it will get good learning outcomes. Learning outcomes are benchmarks to determine a person's learning success (Slameto, 2003, p. 17). Meanwhile, according to Sudjana (2010, p. 28) learning outcomes are assessments of the results of business activities expressed in numbers, letters that can reflect the results achieved by a person within a certain period of time.

Based on the description above, so that the learning process of hair trimming in SMK becomes applicable and can be carried out interactively, inspiring, creative and able to make students disciplined, responsible, it is necessary to analyze the instruments that will be used in learning using project-based learning models. to find out to what extent this instrument in learning hair trimming can be used.

LITERATURE REVIEW

Project-Based Learning Model

Project-based learning model is a learning model that emphasizes students to understand concepts, principles, investigate decisions and represent products. This model is an appropriate learning method used in various sciences because it can improve thinking skills, (Kuswandi et al., 2018). (Afifi & Yulisma, 2020) define the implementation of a project-based learning model in practicum providing freedom for students to plan experiments, choose materials and tools used, and make their own procedures so that students can make various innovations based on the results of investigations.

According to (Widiyanti et al., 2020), to produce students who have high skills and are able to meet the requirements of the industry is to apply the right learning model that can improve students' creative thinking, namely by using the Project-Based Learning Model (PjBL). By using this learning model, students are able to solve current problems or problems given by the teacher. (Brungel et al., 2020) stated that the project-based learning model has a positive effect on students' perceptions, because students encourage self-identification with tasks that they have not liked.

And according to (Sato et al., 2019) the project-based learning model can show its effectiveness, because this method allows students' project completion skills to be evaluated before and after the activity. This is expected to clarify points of view that are not understood by students and allow students to carry out adaptive activities.

(Reis et al., 2020) also argues that the project-based learning model results in this type of teaching-learning approach requiring a different way of thinking and increasing rapid decision-making. Critical thinking, communication, collaboration and creativity are examples of skills that need to be worked on. Ideation and innovation are also developed in the process. Students can find solutions to the problems presented they are more motivated to face new challenges. It is an ideal tool for training critical argument people. The main student skills evidenced by this experience are: (1) involvement in real tasks; (2) a clear increase in student responsibilities; (3) and faster decision-making process through the semester.

Project based learning is not an educational process, but a real workflow. This is how teachers and students will work in the future and how they will be in a similar environment, something like this. Creating a meaningful result for the student is the main requirement. For him or her it should be interesting and important (Menshikova et al., 2019). (Dragoumanos et al., 2017) students visualize the idea, and manage the steps up to develop an Minimum Viable Product (MVP) and promote it. Teaching using PBL, gives students the opportunity to face real problems, and think of solutions that can be adopted from society.

According to (Quesada-l et al., 2020) Project-Based Learning Model is a teaching and learning methodology in which students develop projects under real conditions to acquire knowledge and develop skills needed for their profession. (de la Puente Pacheco et al., 2019) It was observed that the autonomy and problem-solving competencies received a positive impression from the students and that the application of the PBL method was superior to the traditional teaching method in improving academic performance. However, it was found that the characteristics of social communication within the local context limited the reflection of the participants in the PBL group. This study contributes to future studies by using a complementary instrument that provides an analysis of the effectiveness of teaching methods in different geographical contexts.

The steps for implementing the Project-Based Learning Model were adopted from Kesser & Karahoca 2010 (in Kosasih, 2014: 98) as follows:
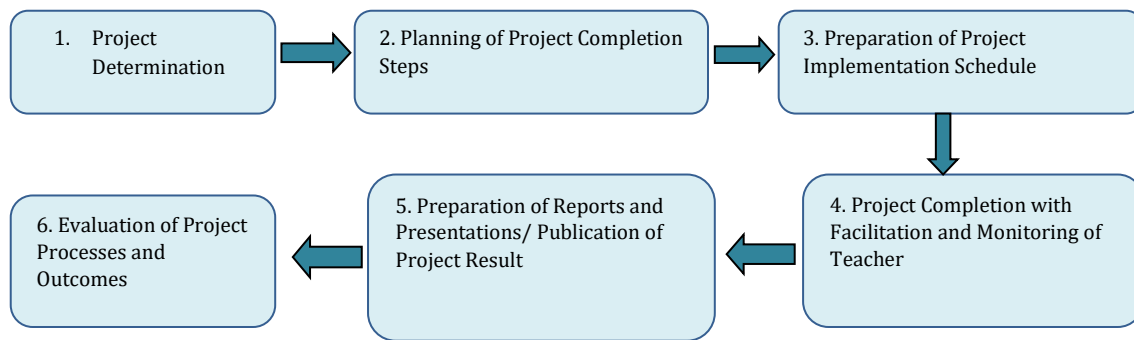
Figure 1. Steps of Project-Based Learning Model

Outcomes Learning

The According to Arikunto (2009: 43) learning outcomes are the final results after experiencing the learning process which can be seen from changes in behavior that can be observed and measured. Learning outcomes can be said to be changes that occur in individuals as a result of the efforts made or individual interactions with the environment. Individual results can be seen from the results of the evaluation carried out in stages during the teaching and learning process, evaluation can be carried out with the initial activities of the teaching process taking place or at the end of the teaching and learning activities.

According to Sudjana (2010: 22) learning outcomes are abilities possessed by students after receiving learning experiences. In line with that, Sudjana (2010: 28) learning outcomes is an assessment of the results of business activities expressed in the form of numbers, letters that can reflect the results achieved by a person within a certain period of time.

(Sulastri et al., 2006) Learning outcomes are a final assessment of the process and introduction that has been done repeatedly. Learning outcomes will not be easily lost because learning outcomes participate in shaping individual personalities who always want to achieve better results so that they will change the way of thinking and produce better work behavior. Learning outcomes are the results obtained in the form of impressions that result in changes in individuals as a result of activities in learning according to Benjamin S. Bloom who proposed three taxonomies with the learning domain, namely affective, cognitive and psychomotor.

(Sanjaya & Prasandy, 2019) The output of study should reflect competencies about what students should understand and capable after completing the study process. This output is called learning outcomes, that will define the knowledge and skills that graduates should possess. There are three (3) domains of behavior that could be specified by learning outcomes:
1. Cognitive, which involves the process of thoughts,
2. Affective, which involves feelings, social aspects, and attitudes, and

3. Psychomotor, which involves the physical abilities

From some of the opinions above, it can be concluded that learning outcomes are something obtained from activities that will change a person's identity, in the form of experience or knowledge that can provide value to the individual.

Commercial Hair Trimming

Etymologically pruning is an act of cutting that has been done since antiquity in a simple way. With the development of the era and the demands of society at that time, who wanted a change in the pruning model that was different from the others. So, in the twentieth century barbershop experts created several trimming models that produced very beautiful shapes (Rostamailis, 2008: 297).

According to Turyani (2016: 11) the purposes of trimming include: beautifying the shape of the head, simplifying hair management, giving the impression of an oval face, sharpening facial lines, preventing hair from falling to the front of the face and following the current model and so on. So, it can be concluded that trimming is an action to reduce the original hair length with certain techniques. To fit a person's face shape, hair type, stature, occupation and personality. So as to produce the desired crop model. According to (Astati Sutriati, 2001) trimming is an important stage in the hair styling process by reducing the length of the hair to achieve the desired goal. (Sunhem & Pasupa, 2016) believes that recommendations for women's hairstyles for various face shapes are very important because this will affect their self-confidence. (Juliawati, 2017) Basic hair trimming is an act of reducing the original length of hair with the help of a comb, scissors and fingers with the fingers following the direction of the line design line or the trim pattern design line to guide the direction of the cut based on the trim pattern, in order to produce a balanced haircut, structured and precise. Meanwhile, the commercial definition in the Big Indonesian Dictionary online is of high commercial value or intended to be traded. So Commercial Hair Trimming is a reduction in hair length that can be sold or sold in the market.

METHODS

In research on instrument analysis, the effect of project-based learning models on learning outcomes in these basic competencies is calculated: (1) syllabus validation results; (2) the results of the validation of the learning implementation plan; (3) cognitive assessment instrument; (4) psychomotor assessment instrument; (5) attitude assessment instrument; (6) project-based learning modules; (7) item validity; (8) the level of difficulty of the items; (9) differentiating power of items; (10) test item reliability. The results of this instrument validation will be validated by three validators who are experts in their fields. To get the results of the feasibility of the learning instrument, the average instrument validation results from each validator are calculated. By using the formula:

$$\% \, Vs \, x = \frac{Total \ Scoring \ score}{Maximum \ Score} \times 100\%$$

(Gabel and Samuel, 1987: 695-696, in Azwar, 2001:80)
Description:
Vs x : content validity

Contents Validation Criteria
81%-100%   : very high
61%- 80%   : tall
41%- 60%   : enough
21%-40%   : low
0%-20%   : very low

In addition, the questions that will be tested for validity are pre-test and post-test questions with a total of 30 items. In this study, the item validity test was calculated using the product-moment formula (assisted by SPSS For Windows) with rough numbers, namely:

$$r_{xy} = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{\{N\sum x^2\}\{N\sum y^2 - (\sum y)^2\}}}$$

(Arikunto, 2010: 72)

In addition to the validity of the items, the level of difficulty of the items and the differentiating power of the items will be calculated using SPSS assistance. In this study, the reliability test was calculated using the Conbach Alpha formula. The formula used is:

$$r_{tt} = \left[\frac{k}{k-1}\right]\left[\frac{v_t - \sum pq}{v_t}\right]$$

(Arikunto, 2010: 238)

RESULTS AND DISCUSSIONS

1. Aspects of the syllabus assessment used as validation materials are: (1) the identity of the education unit; (2) Subject identity; (3) Class; (4) semesters; (5) core competencies; (6) basic competencies; (7) indicators; (8) subject matter; (9) learning process; (10) assessment; (11) allocation of time and learning resources. And based on the results of the validation of the syllabus on the competence of commercial hair trimming, an average value of 92.67% was obtained. So it can be concluded that there is consistent validation of the syllabus on the basic competencies of commercial hair trimming so that it is declared valid and feasible to use.

2. Aspects of the assessment of the Learning Implementation Plan (RPP) using a project-based learning model that is used as validation material, namely: (1) Identity of the lesson plan; (2) Core Competencies; (3) Basic Competencies; (4) Formulation of Indicators; (5) Formulation of Learning Objectives; (6) Learning Materials; (7) Learning Models and Methods; (8) Formulation of media, tools and learning resources; (9) Formulation of learning scenarios; (10) Assessment. And based on the results of the validation of the learning implementation plan using a project-based learning model on the basic competencies of commercial hair trimming, an average value of 94.4% was obtained. So it can be concluded that there is consistent validation of the learning implementation plan (RPP) on the basic competencies of commercial hair trimming and is declared valid and feasible to use.

3. Aspects of assessment Knowledge (cognitive) assessment instruments used as validation materials are: (1) content suitability; and (2) grammar and sentences. Based on the results of the validation carried out by 3 validators, the results were 93.36%. So, it can be concluded that there is consistent validation of the knowledge assessment instrument on the basic competence of commercial hair trimming and is declared valid and feasible to use.

4. Aspects of assessment Skill assessment instruments (psychomotor) used as validation materials are: (1) content suitability; and (2) grammar and sentences. Based on the results of the validation carried out by 3 validators, the results were 93.31%. So, it can be concluded that there is consistent validation of the skill assessment instrument on the basic competence of commercial hair trimming and is declared valid and feasible to use.

5. Aspects of assessment Attitude (affective) assessment instruments used as validation materials are: (1) content suitability; and (2) grammar and sentences. Based on the results of the validation carried out by the validator and then calculated the average result is 96.89%. So, it can be concluded that there is consistency in the validation of the attitude assessment instrument on the competence of commercial hairdressing which is declared valid and feasible to use.

6. Aspects of assessment in the Project-Based Learning Module that are used as validation are: (1) Characteristics; (2) Contents; (3) Language; (4) Illustration; (5) Formats; (6) Covers; (7) Manners. Based on the results of the validation obtained the average value of 93.1%. So, it can be concluded that there is consistent validation of the project-based learning module that is valid and feasible to use.

7. In the validity of these items, 30 questions will be used for the pretest and posttest, which have been tested on 15 students. From the results of calculating the validity of the items using the product moment formula assisted by SPSS version 23, the 30 items were declared valid because they obtained a significance level value (α) 0.05. Thus, it can be concluded that the 30 pretest and posttest questions on the basic competence of commercial hair trimming were declared valid and feasible to use.

8. At the level of difficulty this item is calculated using the product moment formula assisted by SPSS version 23. Of the 30 items calculated, a percentage of 16.67% is obtained for the easy item category (5 items), 70% for the medium item category. (21 items), and 13.33% for the category of difficult items (4 items).

9. The results of the calculation for the differentiating power of 30 questions on the basic competence of hair trimming using the product moment formula with the help of SPSS version 23 get very good criteria. This means that questions that have excellent discriminating power can be used because these questions are able to distinguish between students who have high abilities and students who have low abilities.

10. In this item reliability test, 30 items have been tested for the validity of the items using SPSS version 23. The results of the pre-test and post-test reliability tests on the basic competencies of complete commercial hair trimming can be seen in Table 1.

Table 1. Item Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.753	31

Based on the results of the reliability test using the Cronbach's Alpha formula, the results were 0.753. Thus, it can be concluded that the pretest and posttest items on the basic competence of commercial hair trimming are said to be reliable.

CONCLUSIONS

Before conducting research, it is very important to analyze the instrument to be used, whether the instrument is valid and feasible to use. So this research was carried out before the instrument was tested, the instruments analyzed were

as follows along with the results of the researcher's analysis: (1) syllabus validation of 92.67% was declared valid and feasible to use; (2) RPP validation of 94.4% is declared valid and feasible to use; (3) the validation of the cognitive assessment instrument of 93.36 was declared valid and feasible; (4) validation of the psychomotor assessment instrument of 96.89% was declared valid and feasible to use; (5) the validation of the affective assessment instrument of 96.89% was declared valid and feasible to use; (6) validation of project-based learning modules of 93.1% is declared valid and suitable for use; (7) the results of the validity of 30 items were declared valid because the sig value was obtained. (α) 0.05 then it is declared valid and suitable for use; (8) the level of difficulty of the items obtained is 16.67% for the items in the easy category, 70% for the items in the medium category, 13.33% for the items in the difficult category; (9) the differentiating power for 30 items was found in a very good category so that it was declared valid and feasible to use; (10) the reliability test of 30 items got a value of 0.753 and was declared reliable.

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Author's Contributions

All authors discussed the results and contributed to from the start to final manuscript.

Conflict of Interest

The authors declare that they have no competing interests.

REFERENCES

Afifi, R., & Yulisma, L. (2020). *Implementasi Model Pembelajaran Berbasis Proyek Dalam Praktikum untuk Meningkatkan Intensi Berwirausaha Mahasiswa. 12*, 17–23. https://doi.org/10.25134/quagga.v12i1.2127.Received

Arikunto, Suharsimi. (2009). Prosedur Penelitian Suatu Pendekatan Praktek. Jakarta: Rineka Cipta

Astati, S. (2001). Dasar-dasar Pemangkasan. Jakarta: Rineka Cipta

Azwar, S. (2001). Reliabilitas dan Validitas. Yogyakarta: Pustaka Pelajar

Brungel, R., Ruckert, J., & Friedrich, C. M. (2020). *Project-Based Learning in a Machine Learning Course with Differentiated Industrial Projects for Various Computer Science Master Programs. Ml*, 1–5. https://doi.org/10.1109/cseet49119.2020.9206229

de la Puente Pacheco, M. A., Guerra Florez, D., de Oro Aguado, C. M., & Llinas Solano, H. (2019). Does Project-Based Learning work in different local contexts? A Colombian Caribbean case study. *Educational Review*, *00*(00), 1–20. https://doi.org/10.1080/00131911.2019.1694489

Dragoumanos, S., Kakarountas, A., & Fourou, T. (2017). Young technology entrepreneurship enhancement based on an alternative approach of project-based learning. *IEEE Global Engineering Education Conference, EDUCON*, *April*, 351–358. https://doi.org/10.1109/EDUCON.2017.7942872

Juliawati, H. T. R. I. (2017). Pelatihan Pangkas Rambut Solid Untuk Pembekalan Keterampilan Bagi Ibu-Ibu Pkk Putat Jaya Surabaya. *Jurnal Tata Rias*, *06*(4). https://jurnalmahasiswa.unesa.ac.id/index.php/jurnal-tata-rias/article/view/20462

Khairina, D. M., Ramadhani, F., Maharani, S., & Hatta, H. R. (2016). Department recommendations for prospective students Vocational High School of information technology with Naïve Bayes method. *ICITACEE 2015 - 2nd International Conference on Information Technology, Computer, and Electrical Engineering: Green Technology Strengthening in Information Technology, Electrical and Computer Engineering Implementation, Proceedings*, 92–96. https://doi.org/10.1109/ICITACEE.2015.7437777

Kosasih, E. (2014). Strategi Belajar dan Pembelajaran Implementasi Kurikulum 2013. Bandung: Yrama Widya

Kuswandi, D., Surahman, E., Zufar, Z., Thaariq, A., & Muthmainnah, M. (2018). K-Means Clustering of Student Perceptions on Project-Based Learning Model Application. *2018 4th International Conference on Education and Technology (ICET)*, 9–12. https://ieeexplore.ieee.org/document/8693932

Menshikova, M. A., Gavrilova, T. V, Smirnova, P. V, & Piunova, Y. V. (2019). Improving the Quality of Higher Education with the Project Based Learning. *2019 International Conference "Quality Management, Transport and Information Security, Information Technologies" (IT&QM&IS)*, 50–53. https://doi.org/10.1109/ITQMIS.2019.8928306

Quesada-l, C., Rica, U. D. C., Rica, C., Mart, A., Rica, U. D. C., & Rica, C. (2020). *Implementation of Project Based Learning : Lessons Learned*. https://ieeexplore.ieee.org/document/9073962

Reis, S. S., Coelho, F. G., & Coelho, L. P. (2020). Biomedical students' motivation with project based learning: A case study. *IEEE Global Engineering Education Conference, EDUCON*, *2020-April*, 315–318. https://doi.org/10.1109/EDUCON45650.2020.9125126

Rostamailis, dkk. 2008. *Tata Kecantikan Rambut Jilid 2.* Jakarta: Diektorat Pembinaan Sekolah Kejuruan

Sanjaya, L. S., & Prasandy, T. (2019). Application Design of Students ' Learning Outcomes Completion in BINUS Online Learning. *2019 International Conference on Information Management and Technology (ICIMTech)*, *1*(August), 218–223.

Sato, Y., Hazeyama, A., Nakamura, S., & Miyadera, Y. (2019). Development of a Project Based Learning Evaluation Method Based on PBLBOK. *Proceedings of the 2018 IEEE 10th International Conference on Engineering Education, ICEED 2018*, 127–132. https://doi.org/10.1109/ICEED.2018.8626926

Slameto. (2013). *Belajar dan Faktor-Faktor yang Mempengaruhinya.* Jakarta: PT Rineka Cipta

Sudjana, Nana. (2010). *Dasar-dasar Proses Belajar*. Bandung: Sinar Baru Bandung

Sulastri, Imran, & Arif, F. (2006). *Meningkatkan Hasil Belajar Siswa Melalui Strategi Pembelajaran Berbasis Masalah Pada Mata Pelajaran IPS di Kelas V SDN 2 Limbo Makmur Kecamatan Bumi Raya. 3*(1).

Sunhem, W., & Pasupa, K. (2016). An approach to face shape classification for hairstyle recommendation. *Proceedings of the 8th International Conference on Advanced Computational Intelligence, ICACI 2016*, 390–394. https://doi.org/10.1109/ICACI.2016.7449857

Turyani, Sri Mayrawati Eka, 2009. *Pratata dan Penataan.* Sawangan: PPPPTK Bisnis dan Pariwisata.

Widiyanti, Marsono, Eddy, D. L., & Yoto. (2020). Project-based learning based on stem (science, technology, engineering, and mathematics) to develop the skill of vocational high school students. *4th International Conference on Vocational Education and Training, ICOVET 2020*, 123–126. https://doi.org/10.1109/ICOVET50258.2020.9230088