IJORER : International Journal of Recent Educational Research
Homepage : https://journal.ia-education.com/index.php/ijorer
Email : ijorer@ia-education.com

p-ISSN : 2721-852X ; e-ISSN : 2721-7965
IJORER, Vol. 5, No. 6, November 2024
Page 1407-1419

Analysis of Program Learning Outcome As A Result of Curriculum Evaluation In Higher Education

Wahyu Dwi Mulyono[1*], Gde Agus Yudha Prawira Adistana[1], Heri Suryaman[1], Desy Ratna Artaningtyas[1], Yuli Sutoto Nugroho[2]
[1] Universitas Negeri Surabaya, Surabaya, Indonesia
[2] Queen Mary University of London, London, England

Check for updates OPEN ACCESS

DOI: https://doi.org/10.46245/ijorer.v5i6.705

Sections Info

Article history:
Submitted: October 6, 2024
Final Revised: November 19, 2024
Accepted: November 21, 2024
Published: Desecember 07, 2024

Keywords:
Building Construction Education;
Curriculum;
Higher Education;
Program Learning Outcomes.

ABSTRACT

Objective: One measure of achieving educational goals in higher education is the achievement of program learning outcomes (PLO). This learning achievement needs to be monitored and evaluated to develop the curriculum of the study program. This research aims to analyze the learning outcomes of undergraduate programs in building construction education. **Method:** This research is a type of evaluation research. The research subjects were all courses in The Undergraduate Program of Building Construction Education, Faculty of Engineering, Universitas Negeri Surabaya. Data collection techniques used documentation and observation. Data analysis used quantitative descriptive techniques. **Results:** The results of this study indicate that based on the evaluation of learning outcomes, several courses have yet to reach the achievement limit (below 75). Therefore, the study program needs to formulate actions that can be taken to improve this condition. The improvement plan is highly dependent on the study program's objectives, graduate users' needs, and each course's characteristics. **Novelty:** The novelty of this research is the differences in instruments, research subjects, time, and specific learning outcome programs in the building construction education study program.

INTRODUCTION

Education is a learning process that aims to develop individual potential intellectually, emotionally, socially, and morally. Through education, a person gains the knowledge, skills, values, and attitudes needed to function effectively in society and live a productive and meaningful life. Education can occur in various contexts, including schools, families, communities, and through everyday life experiences (Blossfeld & von Maurice, 2019; Darling-Hammond et al., 2020). Education is not only limited to the transfer of knowledge from teacher to student but also includes the development of critical thinking skills, creativity, collaboration, and social skills (Supena et al., 2021). In addition, education plays a vital role in forming one's character and personality, instilling ethical, moral, and civic values necessary to live in a civilized and peaceful society (Birhan et al., 2021; Intania & Sutama, 2020).

The purpose of education is one of the fundamental aspects of the education system that is the basis for curriculum development, teaching methods, and learning evaluation. In general, the purpose of education can be divided into several categories, which include intellectual, moral, social, and practical skills (Kopnina, 2020). The ultimate goal of education is to help individuals reach their maximum potential and contribute positively to society (Leicht et al., 2018). 21st-century education is a concept that refers to the transformation of the education system to meet the needs of an

increasingly complex and rapidly changing global society (Leicht et al., 2018). This era is marked by the development of information technology, globalization, and social change that demands different skills and competencies than in previous eras. 21st-century education is not only about mastering knowledge but also about how individuals can adapt and innovate in a dynamic world (González-Pérez & Ramírez-Montoya, 2022).

Higher education is a formal level undertaken after secondary education, such as high school or equivalent. Academic programs conducted by universities, institutes, polytechnics, academies, and colleges that grant bachelor's (S1), master's (S2) or doctoral (S3) degrees are referred to as higher education. Vocational and professional education programs are another aspect of higher education that prepares graduates for employment in specific sectors. Higher education is essential in developing science, technology, art, and culture. Higher education institutions not only function as places of teaching and learning but also as centers for research, development, and application of science that can contribute to society's progresssociety's progress. One of the largest higher education institutions in East Java, Indonesia, is the State University of Surabaya (UNESA).

The Undergraduate Program of Building Construction Education is the study program in the Faculty of Engineering at Universitas Negeri Surabaya (UNESA). This study program is a bachelor's level that produces graduates as educators in vocational high schools (VHS) that prepare graduates to work with specific applied skills. Vocational education is essential to developing nations' development strategies because it can boost economic growth, supply trained labor for industry, lower unemployment, and alleviate poverty among low-income populations (Prahani et al., 2020). The direction of learning aligns with the objectives of the Sustainable Development Goals (SDG) 2030 Qu.ality education is the fourth SDG objective, and complete and productive employment, decent work for all, and inclusive and sustainable economic growth are the eighth.

ASIIN Germany has internationally accredited the Undergraduate Program of Building Construction Education. As a form of continuity in achieving this international accreditation, one of the indications that must be considered internally in the study program is the achievement of the program learning outcome (PLO). The achievement of PLO is one of the benchmarks for learning in the study program. Each course in the study program curriculum has learning outcomes designed to support all or some of the PLOs that the study program has set. The curriculum arranged according to ASIIN is referred to as Outcome Education (OBE). This OBE is based on the provisions of the Indonesian Ministry of Education and Culture, where the current education system approach is to use an approach with education based on external achievements or results by the objectives of the study program. OBE is an education system that focuses more on external results. OBE will measure learning outcomes/outcomes and provide opportunities to develop skills to prepare for the world of work (Srivastava & Agnihotri, 2019). This OBE system is expected to be a solution to dealing with the gap between the rapid growth of technology and resources (Wang, 2022).

OBE focuses on the results of the objectives set by the study program. The determination of study program objectives must be on the achievements of graduates to be produced. There must be a match between study program objectives, graduate learning outcomes, and course learning outcomes. Program learning outcomes (PLO) are essential to measure as a determinant of the success of a study program in achieving its goals. The curriculum to achieve learning outcomes must be measured to obtain

feedback on future curriculum improvement (Sukma Drastiawati et al., 2023). The problems that occur are still differences in lecturer perceptions in measuring learning, and lecturers still need to fully assess learning outcomes based on the CPL of the study program. Therefore, continuous measurement needs to be carried out by providing training and socialization with all lecturers in the study program (Mufanti et al., 2024; Sun & Lee, 2020).

Research on the analysis of program learning outcomes according to the OBE curriculum in higher education, especially in the undergraduate program of building construction education, has never been conducted. Previous studies measured the level of OBE understanding in English lecturers and explored the inhibiting and supporting factors (Allo et al., 2024; Mufanti et al., 2024). Other studies on OBE focused on developing student competencies and the effectiveness of OBE in higher education (Asbari & Nurhayati, 2024; Pradhan, 2021; Sunra et al., 2024). According to the following statement, research must be done on the analysis of program learning outcomes as a result of curriculum evaluation in higher education, especially in the undergraduate program of building engineering education. The research question is how the program learning outcomes are in the undergraduate program of building construction education.

RESEARCH METHOD

This research is an evaluation research. An evaluation study is carried out to assess the procedure or outcomes that a program has produced, after which judgments are made regarding its continued execution. The evaluation research method is an approach used to assess the effectiveness, efficiency, relevance, and impact of a particular program, policy, or intervention. Evaluation research aims to provide information that can be used by policymakers, program managers, and other stakeholders to make better decisions related to program implementation and improvement (Wanzer, 2020).

The study subjects were all courses in the Undergraduate Program in Building Engineering Education, Faculty of Engineering, Surabaya State University. Data collection techniques used documentation and observation. Data analysis used quantitative descriptive techniques. The study was carried out between April and August 2024 at the State University of Surabaya in the city of Surabaya. Evaluation research is carried out through several systematic stages, as shown in Figure 1.

Figure 1. Research procedure.

RESULTS AND DISCUSSION

Results

Description of the Program Learning Outcome (PLO) the Undergraduate Program of Building Construction Education

The Undergraduate Program of Building Construction Education is one of the study programs in the Faculty of Engineering, Universitas Negeri Surabaya, which provides engineering education courses for undergraduate students. It has level 6 qualifications from the Indonesian Qualification Framework (NQF), including the process and

attitude development. In 2019, National Accreditation (BAN-PT) awarded with an A (Very Good) rating for 2019-2024.

This study program aims to produce professional staff, such as lecturers, teachers, building construction experts, and entrepreneurs, with the following characteristics :(1) Able to use their competence to solve problems related to the field of building engineering education and construction; (2) Able to learn throughout life by continuing education and training both through formal and informal activities; (3) Able to communicate well and work in teams, and be active in professional organizations in the field of building engineering education and construction; (4) Able to become professional who are ethical and responsible in the field of Building Engineering Education and construction.

Program Learning Outcomes (PLO) for this program were created using ASIIN's specific subject criteria (SSC). The PLO was created to address the ASIIN SSC and to adapt to the features in the field of education because it is an educational program. PLO of The Undergraduate Program in Building Construction Education are as follows:

1. Able to harmonize the curriculum of the eyes of his scientific training in vocational education that is relevant to the demands of the development of the global industry.
2. Able to plan, implement, and evaluate innovative learning programs in Building Engineering vocational education that are relevant to the development of the global industry.
3. Able to apply applied research for innovation in vocational learning methods and optimization of building technology products and services relevant to industry needs.
4. I have the essential character of a responsible educator and professional with good ethics.
5. Able to master and apply essential knowledge that supports expertise in the field of building construction, communicating and presenting building engineering knowledge to various problem areas
6. Able to implement ideas to develop entrepreneurial activities
7. Able to develop themselves and learn to live a lifetime to continue their education to a higher level, both formal and informal
8. Able to design construction work in surveys, drawings, structural analysis, budget analysis, and management.
9. Able to apply construction work ranging from surveys, work drawings, structural analysis, budget analysis, and management.
10. Able to evaluate construction work in the form of finished drawings, structural analysis, budget analysis, and management

Points 1, 2, and 3 of PLO mainly serve as the core to accommodate the character required in the educational sector. On the other hand, points 8, 9, and 10 are core to accommodate the character required for the industrial sector. The two are points 4, 5, 6, and 7, which facilitate the two sectors when applied. To support the achievement of PLO, the curriculum structure of the undergraduate program in building construction education consists of 54 required courses and eight optional courses with details of the core personality development courses four courses, scientific and skills courses 32 courses, institutional personality development course seven courses, basic skills courses eight courses, community life program one course, four courses creative work course, with a total of 151 credits and the minimum standard of the student, graduation is 144 credits. The undergraduate program in building construction education has ten PLOs.

The ten PLOs consisted of three PLOs, which included knowledge categories; one PLO, which included the attitude category; three PLOs, which included general competency categories; and three PLOs, which included special competency categories.

Results of Program Learning Outcomes Evaluation

The results of this PLO measurement evaluate the implementation of courses with achievements in each PLO. Each lecturer completes the assessment procedure at the end of the semester on student scores, namely the value of participation, assignments, USS, and final exam. The assessment criteria are displayed in Table 1.

Table 1. PLO criteria.

Values	Criteria	Abbreviation
≥85	Excellent	E
≥80	Very Good	VG
≥75	Good	G
≥70	Very Satisfy	VS
≥65	Satisfy	S
≥60	Fair	FR
≥55	Poor	P
≥40	Very Poor	VP
<40	Fail	FL

Measurements are made of the entire course for the evaluation results in achieving PLO, which will be used as evaluation material for further improvement plans. The following is an overview of the overall achievement of PLO for the courses taught.

Assessment of PLO 1

PLO 1 is supported by 14 courses (1000003006: Basic Education—8320506205: Final Report). Nine subjects met the PLO achievement criteria, namely> 75%, and five courses were not fulfilled. The assessment of PLO 1 can be seen in Figure 2.

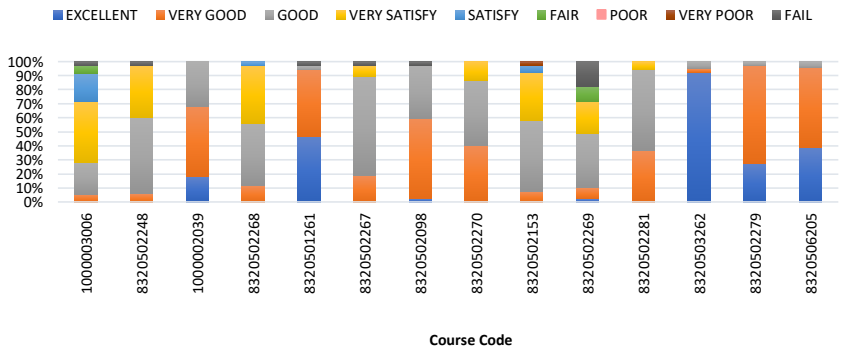

Figure 2. The evaluation result of PLO 1.

Assessment of PLO 2

PLO 2 is supported by 14 courses (1000003006: Basic Education—8320506205: Final Report). Of the 14 courses, ten subjects met the PLO achievement criteria, namely> 75% and four courses did not fulfill them. The assessment of PLO 2 can be seen in Figure 3.

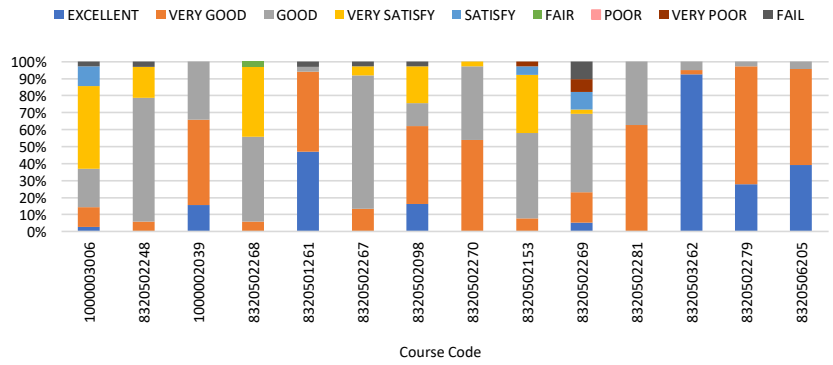

Figure 3. The evaluation result of PLO 2.

Assessment of PLO 3

PLO 3 is supported by 15 courses (1000003006: Basic Education—8320506205: Final Report). Of the 15 courses, 11 subjects met the PLO achievement criteria, namely> 75%, and four courses did not. The assessment of PLO 3 can be seen in Figure 4.

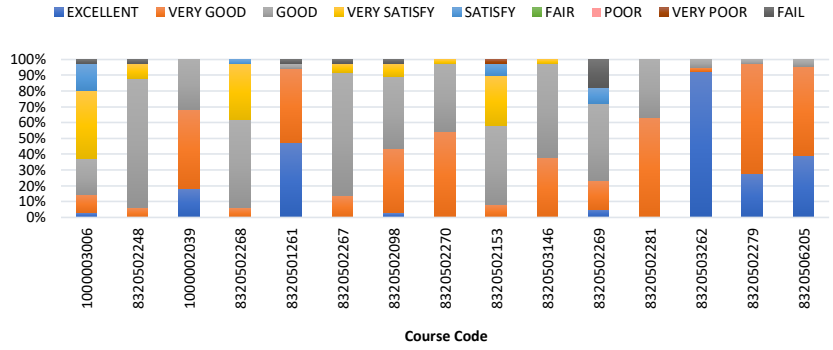

Figure 4. The evaluation result of PLO 3.

Assessment of PLO 4

PLO 4 is supported by seven courses (1000002021: Civic education—8320503080: Community Service). Six subjects have met the PLO achievement criteria, namely> 75%, and one subject has not fulfilled them. The assessment of PLO 4 can be seen in Figure 5.

Figure 5. The evaluation result of PLO 4.

Assessment of PLO 5

PLO 5 is supported by 15 courses (8320503064: Differential Calculus—8320502171: Internship). Six subjects have met the PLO achievement criteria, namely> 75%, and 9 subjects have not fulfilled them. The assessment of PLO 5 can be seen in Figure 6.

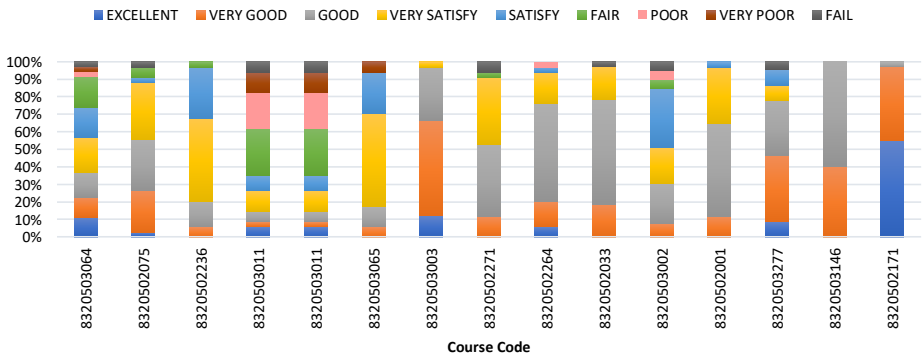

Figure 6. The evaluation result of PLO 5.

Assessment of PLO 6

PLO 6 is supported by four courses (8320502249: Entrepreneurship—8320503080: Community Service). Of these, three subjects have met the PLO achievement criteria, namely> 75%, and one subject has not fulfilled it. The assessment of PLO 6 can be seen in Figure 7.

Figure 7. The evaluation result of PLO 6.

Assessment of PLO 7

Six courses (8320504218: Concrete Structures—8320503146: Research Methodology) support PLO 7. Three subjects have met the PLO achievement criteria, namely> 75%, and three courses have not been fulfilled. The assessment of PLO 7 can be seen in Figure 8.

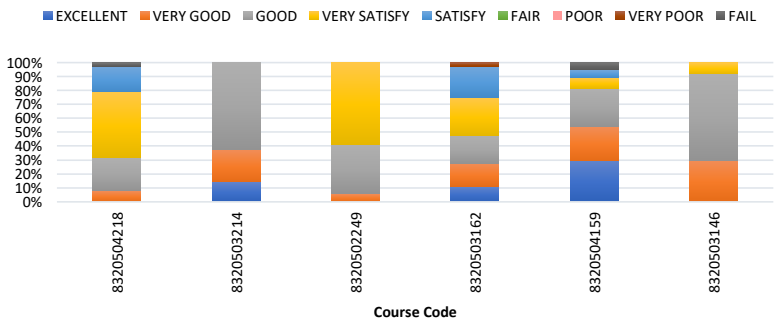

Figure 8. The evaluation result of PLO 7.

Assessment of PLO 8

PLO 8 is supported by 28 courses (8320502075: Non-storey Building Construction—8320506205: Final Report). Of the 28 courses, 12 subjects met the PLO achievement criteria, namely >75%, and 16 subjects did not meet the PLO achievement criteria. The assessment of PLO 8 can be seen in Figure 9.

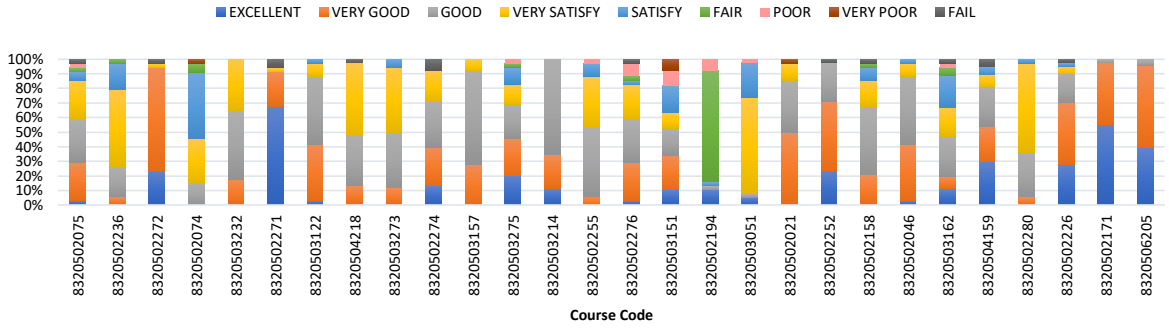

Figure 9. The evaluation result of PLO 8.

Assessment of PLO 9

PLO 9 is supported by 28 courses (8320502075: Non-storey Building Construction—8320506205: Final Report). Of the 28 courses, 14 subjects have met the PLO achievement criteria, namely> 75%, and 14 subjects have not met the PLO achievement criteria. The assessment of PLO 9 can be seen in Figure 10.

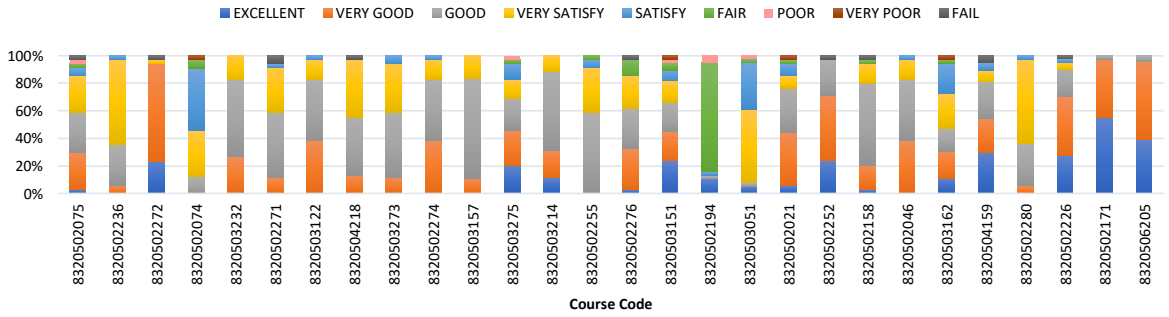

Figure 10. The evaluation result of PLO 9.

Assessment of PLO 10

PLO 10 is supported by 28 courses (8320502075: Non-storey Building Construction—8320506205: Final Report). Of the 28 courses, 14 subjects have met the PLO achievement criteria, namely> 75%, and 14 courses have not been fulfilled. The assessment of PLO 10 can be seen in Figure 11.

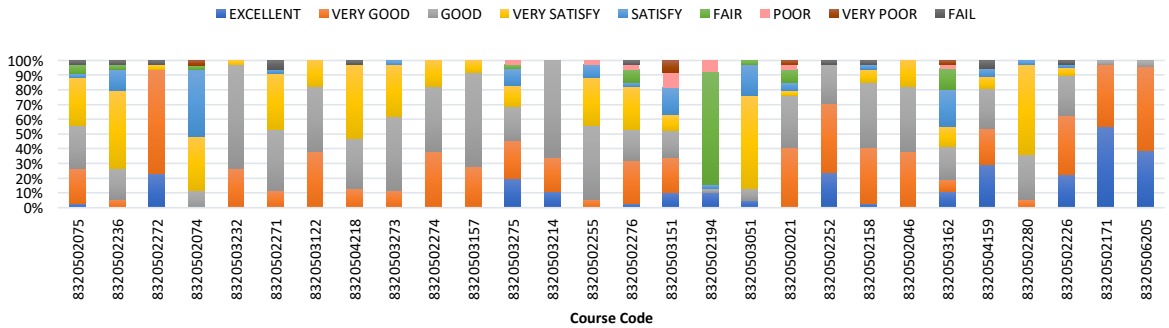

Figure 11. The evaluation result of PLO 10.

Discussion

The PLO recapitulation shows that after the assessment process, several courses still needed to reach the PLO achievement limit (below 75). Therefore, the study program needs to formulate several things that could be done to improve this condition. Improvements must involve all lecturers who teach in the study program. Additionally, the improvement plan must focus on the four main elements of Education 4.0: infrastructure, information and communication technologies, learning methodologies, and competency (González-Pérez & Ramírez-Montoya, 2022; Miranda et al., 2021).

The improvement plan depends on each course's characteristics, but generally, the plan can be summarized as follows. (1) Identify PLOs that have yet to be achieved in each course; (2) Identify components that are weak points in efforts to achieve PLO. The assessment components of a course consist of participation, assignments, mid-semester exams (USS), and final semester exams (US). With in-depth identification, it is expected to find components that cause students not to achieve the expected target; (3) Formulate improvement efforts based on components. Improvement efforts depend on the component type (Asbari & Nurhayati, 2024).

Participation aspects can be improved by improving the learning process. For participation, lecturers must motivate students to be more active at each meeting and conduct student-centered, collaborative, and more interactive learning (Abuhassna et al., 2020; Dada et al., 2023). An engaging classroom can promote diversity and raise students' academic achievement (Sayed et al., 2021). An active learning environment can be created by implementing a learning model that requires students to be active in class. Problem-based learning is one of the available learning models (Damayanti et al., 2024a), and project-based learning (Fawaas et al., 2024).

The task aspect can be enhanced by changing the learning media and procedure. For assignments, the supervisor can provide particular time for guidance. The lecturer can also create an interactive learning forum that involves active student discussion in completing the assignment (Aderibigbe et al., 2023; Damayanti et al., 2024b; Kang & Zhang, 2023). Technology-based learning resources can also enhance learning results (Purnama et al., 2024). Information technology can help students access materials, discuss, and submit assignments (Dini et al., 2024). The ease of accessing and completing assignments will increase students' assignment grades (Yudiana et al., 2024).

USS and US aspects can be improved by evaluating the learning process and outcomes. Test development must be on the material, and the validity and reliability of the test questions must be ensured (Kholis et al., 2020). Before making a test, a key and assessment rubric must be created (Stevens & Levi, 2023).

Lecturers can provide enrichment before the exam (Renzulli & Reis, 2021). These processes cannot run in just one cycle but must be carried out for at least two cycles. After observing the trends that occur in the two cycles and there is still no improvement, efforts are made to make more profound improvements related to the material and competence of the supervisor. It is possible to carry out the PLO improvement process if there are indeed several things that need to be in line that cause the PLO to be difficult to achieve.

CONCLUSION

Fundamental Finding: The results of this study indicate that based on the evaluation of learning outcomes, several courses have yet to reach the achievement limit (below 75).

Therefore, the study program needs to formulate actions that can be taken to improve this condition. The improvement plan is highly dependent on the study program's objectives, graduate users' needs, and each course's characteristics**. Implication:** Lecturers in study programs should improve semester learning plans. Focus group discussions must be conducted for all lecturers in charge of courses to formulate appropriate learning models. The preparation of engaging learning media also needs to be done. Test questions must be valid and reliable according to the material and rubric. **Limitation:** Assessment of the learning outcome program is still limited to the assessment of results, namely the components of participation, assignments, USS, and US; a comprehensive assessment of the learning process has yet to be carried out. **Future Research:** Future researchers are encouraged to improve this research by comprehensively assessing the learning process and outcomes.

ACKNOWLEDGEMENTS

I am grateful to the Faculty of Engineering and the Institute for Research and Community Service, Universitas Negeri Surabaya, for funding this research.

REFERENCES

Abuhassna, H., Al-Rahmi, W. M., Yahya, N., Zakaria, M. A. Z. M., Kosnin, A. B. M., & Darwish, M. (2020). Development of a new model on utilizing online learning platforms to improve students' academic achievements and satisfaction. *International Journal of Educational Technology in Higher Education, 17*(1), 38-45. https://doi.org/10.1186/s41239-020-00216-z

Aderibigbe, S. A., AbdelRahman, A. R. A., & Al Othman, H. (2023). Using online discussion forums to enhance and document students' workplace learning experiences: A semi-private Emirati university's context. *Education Sciences, 13*(5), 458-512. https://doi.org/10.3390/educsci13050458

Allo, M. D. G., Sudarsi, E. T., & Nilma, T. (2024). Implementation of outcome-based education (OBE) principles in the curriculum of the English education study program at a higher education in Toraja. *Onoma, 10*(2), 1379–1391. https://doi.org/10.30605/onoma.v10i2.3505

Asbari, M., & Nurhayati, W. (2024). Outcomes-based education in Indonesian higher education: Empowering students' learning competencies. *International Journal of Social and Management Studies, 5*(5), 1–6. https://doi.org/10.5555/ijosmas.v5i5.445

Birhan, W., Shiferaw, G., Amsalu, A., Tamiru, M., & Tiruye, H. (2021). Exploring the context of teaching character education to children in preprimary and primary schools. *Social Sciences & Humanities Open, 4*(1), 1-11. https://doi.org/10.1016/j.ssaho.2021.100171

Blossfeld, H.-P., & von Maurice, J. (2019). Education as a lifelong process. In H.-P. Blossfeld & J. Roßbach (Eds.), *Education as a lifelong process: The German national educational panel study (NEPS)* (pp. 17–33). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-23162-0_2

Dada, D., Laseinde, O. T., & Tartibu, L. (2023). Student-centered learning tool for cognitive enhancement in the learning environment. *Procedia Computer Science, 217*, 507–512. https://doi.org/10.1016/j.procs.2022.12.246

Damayanti, K., Effendi, M., & Daryono, R. W. (2024a). The effectiveness of the problem-based learning model on student learning achievement in Islamic education

learning. *IJORER: International Journal of Recent Educational Research, 5*(5), 1097–1108. https://doi.org/10.46245/ijorer.v5i5.653

Damayanti, K., Effendi, M., & Daryono, R. W. (2024b). The effectiveness of the problem-based learning model on student learning achievement in Islamic education learning. *International Journal of Recent Educational Research, 5*(5), 653-755. https://doi.org/10.46245/ijorer.v5i5.653

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & David, O. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science, 24*(2), 97–140. https://doi.org/10.1080/10888691.2018.1537791

Dini, N. A. I., Ikhsan, M., Pamungkas, O., & Kuswanto, H. (2024). ICT-based teaching materials on science learning to improve 21st-century skills: A systematic review. *IJORER: International Journal of Recent Educational Research, 5*(5), 1239–1251. https://doi.org/10.46245/ijorer.v5i5.679

Fawaas, M. A. H. Al, Mustofa, Z., & Daryono, R. W. (2024). The effectiveness of contextual teaching and learning (CTL) and project-based learning (PJBL) methods on student learning outcomes. *IJORER: International Journal of Recent Educational Research, 5*(4), 1040–1053. https://doi.org/10.46245/ijorer.v5i4.635

González-Pérez, L., & Ramírez-Montoya, M. (2022). Components of education 4.0 in 21st-century skills frameworks: Systematic review. *Sustainability, 14*(3), 1493-1501. https://doi.org/10.3390/su14031493

Intania, E. V., & Sutama, S. (2020). The role of character education in learning during the COVID-19 pandemic. *Jurnal Penelitian Ilmu Pendidikan, 13*(2), 129–136. https://doi.org/10.21831/jpipfip.v13i2.32979

Kang, X., & Zhang, W. (2023). An experimental case study on forum-based online teaching to improve student engagement and motivation in higher education. *Interactive Learning Environments, 31*(2), 1029–1040. https://doi.org/10.1080/10494820.2020.1817758

Kholis, N., Kartowagiran, B., & Mardapi, D. (2020). Development and validation of an instrument to measure the performance of vocational high school. *European Journal of Educational Research, 9*(3), 955–966. https://doi.org/10.12973/EU-JER.9.3.955

Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. *The Journal of Environmental Education, 51*(4), 280–291. https://doi.org/10.1080/00958964.2019.1710444

Kromydas, T. (2017). Rethinking higher education and its relationship with social inequalities: Past knowledge, present state, and future potential. *Palgrave Communications, 3*(1), 1–12. https://doi.org/10.1057/s41599-017-0001-8

Leicht, A., Heiss, J., & Byun, W. J. (2018). *Issues and trends in education for sustainable development*. UNESCO Publishing. https://doi.org/10.54675/YELO2332

Miranda, J., Navarrete, C., Noguez, J., Molina-Espinosa, J.-M., Ramírez-Montoya, M.-S., Navarro-Tuch, S. A., Bustamante-Bello, M.-R., Rosas-Fernández, J.-B., & Molina, A. (2021). The core components of education 4.0 in higher education: Three case studies in engineering education. *Computers & Electrical Engineering, 93*, 1-10. https://doi.org/10.1016/j.compeleceng.2021.107278

Mufanti, R., Carter, D., & England, N. (2024). Outcomes-based education in Indonesian higher education: Reporting on the understanding, challenges, and support available to teachers. *Social Sciences & Humanities Open, 9*, 1-11. https://doi.org/10.1016/j.ssaho.2024.100873

Pradhan, D. (2021). Effectiveness of outcome-based education (OBE) toward empowering students' performance in an engineering course. *Journal of Advances in Education and Philosophy, 5*(2), 58–65. https://doi.org/10.36348/jaep.2021.v05i02.003

Prahani, B. K., Deta, U. A., Yasir, M., Astutik, S., Pandiangan, P., Mahtari, S., & Mubarok, H. (2020). The concept of "Kampus Merdeka" in accordance with Freire's critical pedagogy. *Studies in Philosophy of Science and Education (SiPoSE), 1*(1), 21–37.

Purnama, M. M., Adha, M. M., Perdana, R., & Maulina, D. (2024). Development of technological learning media to increase students' civic knowledge. *IJORER: International Journal of Recent Educational Research, 5*(5), 1121–1133. https://doi.org/10.46245/ijorer.v5i5.670

Renzulli, J. S., & Reis, S. M. (2021). *The schoolwide enrichment model: A how-to guide for talent development*. Routledge. https://doi.org/10.4324/9781003238904

Sayed Munna, A., & Kalam, A. (2021). Teaching and learning process to enhance teaching effectiveness: A literature review. *International Journal of Humanities and Innovation (IJHI), 4*(1), 1–14. https://doi.org/10.33750/ijhi.v4i1.102

Srivastava, S. K., & Agnihotri, K. (2019). A study on modern teaching pedagogy with special reference to outcome-based education system. *International Journal of Business Excellence, 1*(1), 1-9. https://doi.org/10.1504/ijbex.2019.10028903

Stevens, D. D., & Levi, A. J. (2023). *Introduction to rubrics: An assessment tool to save grading time, convey effective feedback, and promote student learning*. Routledge.

Sukma Drastiawati, N., Yunitasari, B., Hartutuk Ningsih, T., Arif Irfa, M., Heru Adiwibowo, P., & Hafizh Ainur Rasyid, A. (2023). Analysis of outcome-based education (OBE) on the achievement of the program learning outcomes (PLO) in welding design course. *Proceedings of Vocational Engineering International Conference*, 423–427.

Sun, P. H., & Lee, S. Y. (2020). The importance and challenges of outcome-based education: A case study in a private higher education institution. *Malaysian Journal of Learning and Instruction, 17*(2), 253–278. https://doi.org/10.32890/mjli2020.17.2.9

Sunra, L., Aeni, N., & Sally, F. H. S. (2024). A comprehensive exploration of outcome-based education principles and practices. *Asian Journal of Education and Social Studies, 50*(1), 1–9. https://doi.org/10.9734/ajess/2024/v50i11234

Supena, I., Darmuki, A., & Hariyadi, A. (2021). The influence of 4C (constructive, critical, creativity, collaborative) learning model on students' learning outcomes. *International Journal of Instruction, 14*(3), 873–892. https://doi.org/10.29333/iji.2021.14351a

Wang, L. (2022). Establishment of curriculum evaluation system based on OBE concept and employment oriented. In L. C. Jain, R. Kountchev, B. Hu, & R. Kountcheva (Eds.), *Wireless technology, intelligent network technologies, smart services and applications* (pp. 243–247). Springer Singapore.

Wanzer, D. L. (2020). What is evaluation?: Perspectives of how evaluation differs (or not) from research. *American Journal of Evaluation, 42*(1), 28–46. https://doi.org/10.1177/1098214020920710

Yudiana, F. E., Famularsih, S., & Rosyidha, A. (2024). Determinants of e-learning acceptance in Indonesia post-COVID-19 and its impact on students' technopreneurship. *IJORER: International Journal of Recent Educational Research, 5*(5), 1311–1322. https://doi.org/10.46245/ijorer.v5i5.694

*Wahyu Dwi Mulyono (Corresponding Author)
Faculty of Engineering
Universitas Negeri Surabaya
Jl. Ketintang, Gayungan, Surabaya, East Java, 60213, Indonesia
Email: wahyumulyono@unesa.ac.id

Gde Agus Yudha Prawira Adistana
Faculty of Engineering
Universitas Negeri Surabaya
Jl. Ketintang, Gayungan, Surabaya, East Java, 60213, Indonesia
Email: gdeadistana@unesa.ac.id

Heri Suryaman
Faculty of Engineering
Universitas Negeri Surabaya
Jl. Ketintang, Gayungan, Surabaya, East Java, 60213, Indonesia
Email: herisuryaman@unesa.ac.id

Desy Ratna Artaningtyas
Faculty of Engineering
Universitas Negeri Surabaya
Jl. Ketintang, Gayungan, Surabaya, East Java, 60213, Indonesia
Email: desyarthaningtyas@unesa.ac.id

Yuli Sutoto Nugroho
Electronic Engineering and Computer Science,
Queen Mary University of London,
Westfield College ·1887 - East London College/Queen Mary College
Email: nugroho@qmul.ac.uk