JUSTEK : JURNAL SAINS DAN TEKNOLOGI
http://journal.ummat.ac.id/index.php/justek
ISSN 2620-5475
Vol. 8, No. 3, September 2025, Hal. 290-299

OBE Curriculum-Based E-RPS Application Development: An Innovative Approach to Improve Planning Quality

Siti Qomariah[1]*, Jumiyati[2], Muhammad Irfan Anwari[3]
[1,2] *Information Systems, UIN Sultan Aji Muhammad Idris Samarinda, Indonesia*
[3] *Technology Computer Engineers, Politeknik Negeri Samarinda, Indonesia*

Article History:

Received : 06-08-2025
Accepted : 13-09-2025

Keyword:

E-RPS (Electronic Semester Learning Plan); Outcome-Based Education (OBE); Innovative Learning Tools; Curriculum Development.

ABSTRACT

This study aims to develop an Electronic Semester Learning Plan (E-RPS) application based on the Outcome-Based Education (OBE) curriculum to address challenges in curriculum management, such as unstructured data, non-uniform standards, and inefficiencies in manual preparation. The study employed the Research and Development (R&D) approach using the ADDIE model (Analyze, Design, Develop, Implement, Evaluate). Data collection included interviews, questionnaires, and documentation, with respondents selected using a snowball sampling technique. Application performance was tested using black-box and beta testing methods, with Likert-scale-based questionnaires for user feedback. Data analysis focused on usability, functionality, and efficiency. The E-RPS application integrates curriculum elements (CPL, CPMK, and Sub-CPMK) and standardizes the RPS preparation process. It automates workflows, enhances data accessibility, and provides collaborative features for lecturers and administrators. Testing results showed an average user satisfaction rate of 87%, validating the application's effectiveness in improving the quality and accuracy of RPS preparation, aligning with OBE principles. This research provides a practical solution to streamline RPS preparation, enhance transparency in curriculum management, and support international accreditation efforts. The findings contribute to the theoretical understanding of integrating technology with OBE frameworks and offer a replicable model for higher education institutions aiming to improve curriculum quality and compliance

https://doi.org/10.31764/jtam.vXiY.ZZZ

A. INTRODUCTION

Universities (PT) are increasingly facing significant challenges due to pressures from global competitiveness. These challenges are diverse and impact various aspects of the higher education system across the (Habib, 2023). One of the main methods to ensure the quality of higher education is through the accreditation of study programs that meet international standards. This process involves several key aspects (Salto, 2023) International accreditation is a vital tool to ensure the quality of higher education. It provides a structured approach to quality assurance, enhances global recognition of qualifications, and supports student and faculty mobility. However, it also presents challenges that require careful consideration and resource allocation.(Fernandes & Singh, 2022) . One of the main methods to ensure the quality of higher education is through the accreditation of study programs that meet international standards. Here, there can be tension between local educational practices and the standards imposed by international accreditation bodies. For example, non-U.S. universities seeking US accreditation may face challenges in aligning their programs with US standards, potentially delegitimizing on-site practices (Manarbek & Kondybayeva, 2024). Adequate quality assurance requires a robust evaluation mechanism. This includes internal reviews and external validation to ensure continuous improvement (Romanowski, 2022). The accreditation process can be

resource-intensive, requiring significant administrative effort and financial investment (Salto, 2023). International accreditation is an important tool to ensure the quality of higher education. It provides a structured approach to quality assurance, enhances global recognition of qualifications, and supports student and faculty mobility. However, it also presents challenges that require careful consideration and resource allocation. (Fernandes & Singh, 2022).

One of the criteria is the quality of learning delivery and the preparation of an Outcome-Based Education (OBE)-based curriculum. Outcome-Based Education (OBE) is a student-centred approach that focuses on achieving specific, measurable student learning and performance outcomes. Unlike traditional education models that emphasize content delivery and time-based progression, OBE starts with the end goals of what students should know, be able to do, and demonstrate after completing a program (Bhandurge & Suryawanshi, 2024).

The curriculum is structured to align with the desired learning outcomes. This involves setting specific course and program outcomes and mapping them to the curriculum (Noor et al., 2023). OBE requires innovative teaching methods that promote active and collaborative learning, higher-order thinking, and self-learning (Sun & Lee, 2020). Effective implementation of OBE necessitates changes in assessment tools to measure the attainment of learning outcomes accurately. This includes using rubrics, performance indicators, and competency-based assessments (Listiani, 2022; Yadav et al., 2024). Outcome-based education represents a significant shift from traditional education models, focusing on measurable student outcomes and continuous improvement. While it offers numerous benefits, including enhanced student engagement and skill development, its successful implementation requires careful planning, adequate resources, and strong institutional support (Hussain et al., 2024)

Digital transformation in education has been shown to enhance the effectiveness and efficiency of the learning process significantly. Curriculum data such as CPL, CPMK, and Sub-CPMK in the traditional system are unstructured, making it difficult to integrate between curriculum elements. The query addresses the challenge of unstructured curriculum data, such as CPL (Course Program Learning), CPMK (Course Learning Outcomes), and Sub-CPMK (Sub-Course Learning Outcomes), and the difficulty in integrating these elements within traditional educational systems. The abstracts provide insights into the issues and potential solutions related to unstructured data in educational contexts (M. Niemelä, 2022; M. A. Niemelä, 2021)

Various study programs have non-uniform RPS standards and formats, which leads to difficulties in ensuring compliance with Outcome-Based Education (OBE) principles, which impacts the international accreditation of study programs. This question addresses the difficulties various academic programs face in maintaining uniform standards and formats for their Semester Learning Plans (RPS), which impacts their alignment with Outcome-Based Education (OBE) principles and, consequently, their international accreditation.(M. T. Ali et al., 2024; Singh & Singh, 2023; Sumathi et al., 2024)

Using standalone applications such as word processors (e.g. MS Word) causes curriculum data to be integrated and difficult to access. Using standalone applications like word processors in education poses significant challenges in data integration, flexibility, and interoperability. While there have been efforts to develop more integrated and dynamic solutions, several unknowns remain, particularly regarding the effectiveness and impact of these technologies on learning outcomes. Further research and development are needed to address these gaps and create more cohesive and efficient educational environments (Shakirova, 2023; Svetsky et al., 2023).

The purpose of this research is to design and develop an Electronic Semester Learning Plan (E-RPS) application based on the Outcome-Based Education (OBE) curriculum. The development of this application is motivated by various challenges in manual curriculum management, such as unstructured data, non-uniform RPS standards between study programs,

inefficiencies due to the use of stand-alone applications, and the lack of collaborative features between lecturers and administrative managers.

B. METHODS

This research, which aims to produce an application, uses the Research and Development (R&D) method (Winarni, 2021). The application development model, the Analyze, Design, Development, Implementation, Evaluation (ADDIE) model, incorporates a testing and revision process to empirically test a product and reduce or even eliminate errors in its production. (Listiani, 2022). The stages of the ADDIE can be seen in Figure 1

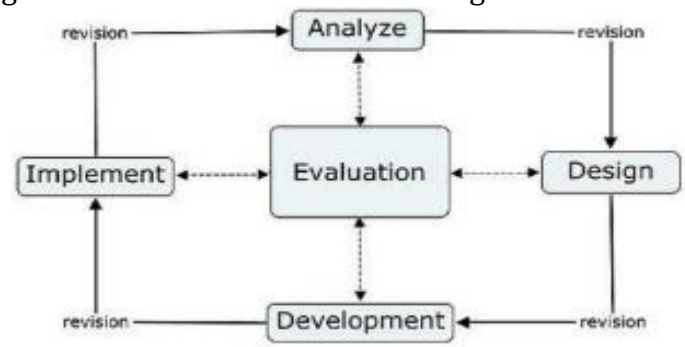

Figure 1. ADDIE Development Model

During the analysis phase, the first step in creating a product involves examining the product's requirements, assessing its viability, and identifying the prerequisites for During the design stage, a systematic design process of concepts, display content, and other elements takes place, with the results still resembling written concepts. Must be met in the development of a product. The development stage transforms the conceptually stated design into a tangible product. The implementation stage involves putting the conceptual design's results into practice using prepared materials for the product. The final step involves evaluating the finished products to identify areas for improvement. We can conduct evaluations both prior to the product's publication and after it has undergone mass testing. The product is published, and then the product has been published and tested en masse.

Black-box testing involves producing a functional test of a product without testing its design or coding. This test determines whether the functionality of a product runs well and whether there are any errors (Cholifah et al., 2018).

Beta testing is a test conducted by users; they are informed of the evaluation procedure and then conduct a review. (Horalek et al., 2023; Jaradat et al., 2022). The assessment for beta testing uses the Likert scale. Scale is used to make measurements, opinions, and perceptions about social phenomena (Sholichin, 2021). For each answer, the assessment is described in Table 1 as follows.

Table 1. Answer table and Score

Answer	Code	Score
Strongly Agree	SA	5
Agree	A	4
Neutral	N	3
Disagree	D	2
Strongly Disagree	SD	1

Table 2. Category

Category	Information
0%-20%	Disagree
21%-40%	Somewhat Disagree
41%-60%	Neutral
61%-80%	Agree
81%-100%	Strongly Agree

For the beta testing method, each question is asked to find a percentage of answers using the following formula:

$$y = \frac{TS}{Ideal\ Score} x100\%$$

Information:
Y = Percentage Value
TS = Total respondent score = $\sum Score\ x\ Respondent$
Ideal Score = Score x the number of respondents.

In the beta test for the application's feasibility, a questionnaire instrument with a list of questions, as shown below, is used. The answer is a Likert scale with five responses and its value. (D. Ali et al., 2023). This research was conducted from January 2024 to November 2024 at UIN Sultan Aji Muhammad Idris Samarinda. This research aims to develop an Electronic Semester Learning Plan (E-RPS) application based on the Outcome-Based Education (OBE) curriculum. We use the ADDIE model because it enables systematic and iterative application development. We design each stage to ensure the app meets the user's needs. The following is an explanation of each stage of this study using the ADDIE development model. This study employs a snowball sampling technique to identify participants and key informants. This technique disperses small samples, similar to snowballs, which are then magnified. The research subjects in this study include the coordinator of the study programs, UPM (kUinit Penjamina Mutu) and GKM (Gugus Kendali Mutu), as well as a team of experts from Mulia University and STMIK Widya Cipta Dharma. Data collection is carried out through interviews, questionnaire distribution, and documentation.

For application development, the applications used are as follows. Laravel, a PHP programming language framework, was developed by MIT and Github. It follows the model-controller-view (MVC) design pattern and utilizes the "Artisan" command line within the Print command. Some of its features include bundles and the Eloquent ORM. (Stauffer, 2023)

Database servers like MySQL are popular because they are free. A Swedish company named MySQL AB, now known as Tcx Data Konsult AB, developed MySQL as a website database around 1994-1995. Nonetheless, the MySQL code base dates back to 1979. Initially, Tcx was a software development and database consulting company, and today, Oracle Corp has acquired MySQL. (Grippa & Kuzmichev, 2021).

C. RESULT AND DISCUSSION

The result should be clear and brief. It presents a logical presentation of the data and/or Information. Factual description of the data describes what the study found. The Discussion should explore the significance of the results/findings of the work, not repeat them. It should present a summary of findings, interpretation of the data, the similarities/differences,

unexpected/negative results, and analysis based on a particular theory, approach and/or concept.

1. Result

The design of the E-RPS application is as follows, as seen in the flowchart chart below:

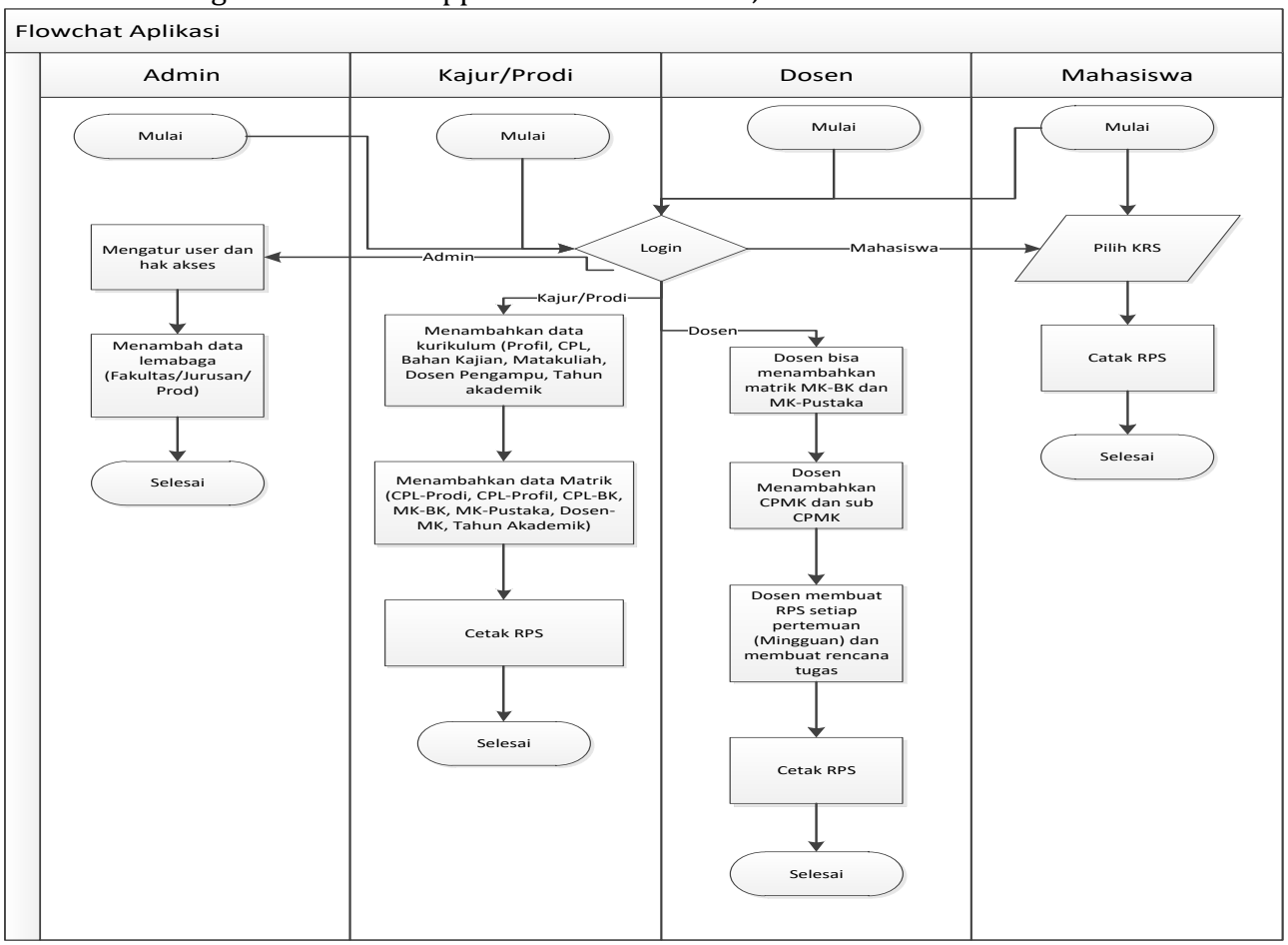

Figure 2. Flowchart App

Here are the results of application development

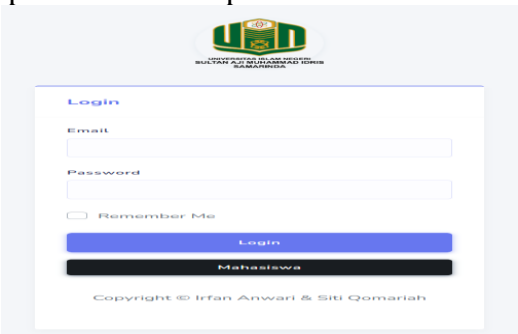

Figure 3. Login

Both users and admins must log in to this section to determine their access rights and what they can do with this Application. You can download the RPS directly from this Application, except for students. Students can download RPS based on semesters and courses without having an account.

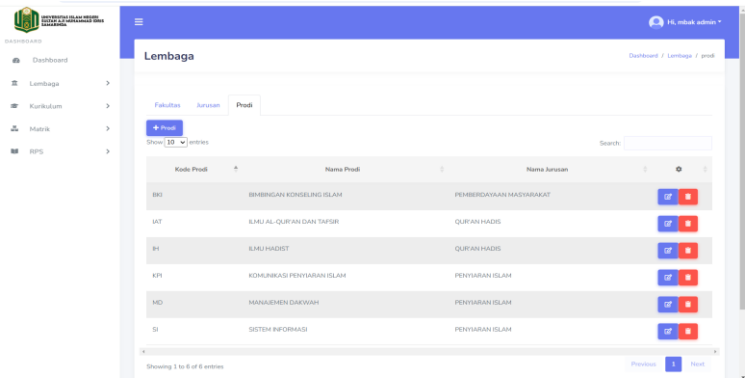

Figure 4. Institution Menu

Admins can add data on faculties, departments and study programs in these faculties and departments. On this page, Kajur/Study Program fills in the data on graduate profiles, CPL, study materials, bibliography, user, and academic year. This page is admin, doing a CPL checklist of what follows the study program, graduate profile, study materials, course matrix with study material, courses with pustaka, lecturer matrix with course and academic year. Which will later be the source of the targets charged to the courses in the study program. On this page, lecturers add CPMK by making sure that the CPMK refers to which CPL and lecturers can also add sub-CPMK. Furthermore, the lecturer added the learning stages every week. This page asks lecturers to fill in the learning stages starting from Sunday, SubCPMK, study materials, learning methods, learning time, learning experience, assessment techniques, assessment weights, and references. Next is the assignment to students, as seen in the image below.

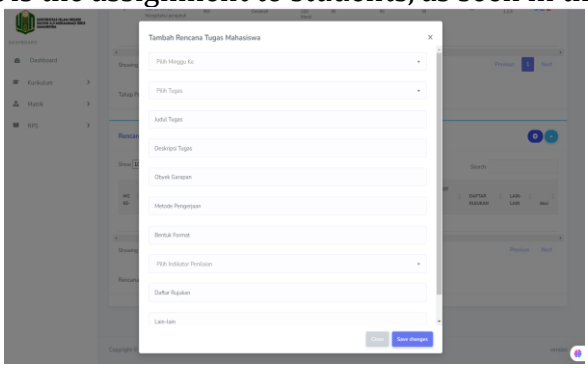

Figure 6. Student Assignment Plan

In this section, lecturers are asked to input what task plan will be given to students, as well as assignment descriptions and evaluation indicators that are adjusted to Rubik's. Blackbox testing is carried out to evaluate how the system has been created and ensure that the components and functions in the system function as appropriate. This black box test can be seen in the following table 4.

Table 4. Blackbox testing

It	Test Name	Description	Preconditions	Input	Expected success	Conclusion
1	Login Testing	Testing by entering the correct username and password	The login form has appeared	"Correct" Username "Correct" Password	Conclude dashboard page	Succeed
		Testing by entering the wrong		Username "incorrect"	Displaying pages with incorrect username and	Succeed

		username and password		Password "incorrect"	password messages	
2	Testing featuring Institution	Testing to display institutions	The Institution's page has been featured		Displaying the Institution Menu	Succeed
3	Testing displays the curriculum	Testing to display the curriculum	The curriculum page has appeared		Showcase curriculum	Succeed
4	Testing displays Matrix	Testing to display a matrix	The matrix page has appeared		Displaying a matrix	Succeed
5	Testing the RPS	Testing to display RPS	The RPS page has appeared	Select the Print RPS list	Displaying the Print RPS list	Succeed

Beta testing was carried out with five respondents in the form of a questionnaire. The results of the questionnaire data collection, data and calculation of the results of the beta testing test can be seen below

Table 5. Results of questionnaire data collection

Question	Respondent's Answer					Calculation Table Per Variable
	STS	TS	N	S	SS	
Application Interface Testing						
Application Interface Testing	0	0	0	3	2	88%
Young apps are used	0	0	1	1	3	88%
The app's Tamil arrangement is like buttons and has a nice menu structure.	0	0	1	2	2	84%
On-Target Testing of Applications						
On-target Application	0	0	0	3	2	88%
The Application makes it easier for lecturers to prepare Semester Learning Plans (RPS)	0	0	1	1	3	88%
Curriculum information such as CPL, CPMK, and Sub-CPMK are displayed	0	0	1	2	2	84%
The Application facilitates coordination between lecturers and the administration	0	0	0	3	2	88%
Application Performance Testing						
Application Performance Testing	0	0	0	3	2	88%
Apps can save data quickly	0	0	1	1	3	88%
The app can display news, subject matter, and assignments quickly	0	0	1	2	2	84%
The Application can chat with fellow users who are online	0	0	0	3	2	88%
The Application can download defense material files quickly	0	0	1	1	3	88%
There are no bugs or errors in the system	0	0	1	2	2	84%
Application Efficiency Testing						
Application Efficiency Testing	0	0	0	3	2	88%

The Application can save time. RPS Preparation	0	0	1	1	3	88%
Average Score of all questions answered by respondents						87%

2. Discussion

In traditional systems, unstructured curriculum data, like CPL, CPMK, and Sub-CPMK, hinder integration and complicate RPS alignment. In the OBE framework, structured and interconnected data is essential for achieving learning outcomes. This study shows that the E-RPS application effectively resolves these issues by systematically integrating curriculum elements. This aligns with research (Mahzari et al., 2023; Shaltry, 2020; Zhang, 2024; Zhao & Fan, 2023). Non-uniform RPS standards across study programs hinder the consistent Application of OBE principles, making it difficult to meet international accreditation standards. Limitations of Standalone Applications: Using traditional applications such as word processors causes curriculum data to be integrated and difficult to access. This system is not only time-consuming but also prone to human error. The web-based E-RPS application is designed to replace this approach by providing a centralized platform that facilitates access, update, and analysis of curriculum data. This study proves that this Application can reduce barriers to curriculum data accessibility and improve the efficiency of the RPS management process.(Svetsky et al., 2023)

Manual RPS preparation is time-consuming and prone to errors. This study shows that the E-RPS based on the OBE curriculum addresses these issues by automating processes and providing validation features, speeding up preparation and ensuring accuracy. The E-RPS enhances efficiency in academic document preparation and improves learning outcomes through better mapping of CPMK to CPL. This is in line with research (Singh & Singh, 2023)

D. CONCLUSION AND SUGGESTIONS

It also can be followed by suggestions or recommendations (if any) for decision-makers or further research, but it is optional. This research aims to develop an E-RPS application based on the OBE curriculum that can improve the quality of learning planners. Able to systematically Integrate curriculum elements such as CPL, CPMK, and Sub-CPMK. Increase transparency and accountability in curriculum management. Making it easier for lecturers to prepare RPS per OBE principles, with application performance tested through black box and beta testing, achieving an average respondent satisfaction level of 87%.

Theoretical benefits Provide new insights into the Application of OBE curriculum-based technologies, which could be the basis for developing similar applications in higher education. Benefits of practice Simplify the process of preparing and evaluating RPS, thereby increasing the work efficiency of lecturers and providing easy access to various stakeholders (students, lecturers, administration) to integrated and centralized curriculum information. Providing tools that support the accreditation of study programs with international standards. The limitation of this study is that the application implementation is still limited to one educational Institution, so it cannot be tested on a broader scale. A learning outcome monitoring feature must be added and integrated with the academic system.

ACKNOWLEDGEMENT

This research was supported/partially supported by UIN Sultan Aji Muhammad Idris Samarinda, for funding my research (LITABDIMAS 2024). We thank supported/partially supported by STMIK Widya Dipta Dharma and Mulia University Balikpapan.

REFERENCES

Ali, D., Yang, Z., Hussain, A., & Sheikh, M. I. (2023). The H(n)-move is an unknotting operation for virtual and welded links. *Journal of Knot Theory and Its Ramifications*, *32*(09). https://doi.org/10.1142/S021821652350061X

Ali, M. T., Rahman, M. A., Mannan, M. A., Zishan, M. S. R., Chisty, N. A., & Hossain, C. A. (2024). Impact of Intermediate Indicators on Attaining Cognitive Program Outcomes. *Journal of Engineering Education Transformations*, *38*(2), 187–196. https://doi.org/10.16920/jeet/2024/v38i2/24201

Bhandurge, P., & Suryawanshi, S. S. (2024). Question Paper Design in Line with Outcome-Based Education Policy. *Indian Journal of Pharmaceutical Education and Research*, *58*(4s), s1201–s1210. https://doi.org/10.5530/ijper.58.4s.117

Cholifah, W. N., Yulianingsih, Y., & Sagita, S. M. (2018). Pengujian Black Box Testing pada Aplikasi Action & Strategy Berbasis Android dengan Teknologi Phonegap. *STRING (Satuan Tulisan Riset Dan Inovasi Teknologi)*, *3*(2), 206–210.

Fernandes, J. O., & Singh, B. (2022). Accreditation and ranking of higher education institutions (HEIs): review, observations and recommendations for the Indian higher education system. *The TQM Journal*, *34*(5), 1013–1038. https://doi.org/10.1108/TQM-04-2021-0115

Grippa, V. M., & Kuzmichev, S. (2021). *Learning MySQL*. " O'Reilly Media, Inc."

Habib, M. (2023). Digital transformation strategy for developing higher education in conflict-affected societies. *Social Sciences & Humanities Open*, *8*(1), 100627. https://doi.org/10.1016/j.ssaho.2023.100627

Horalek, J., Urbanik, P., & Sobeslav, V. (2023). *Automated Tests Using Selenium Framework* (pp. 23–40). https://doi.org/10.1007/978-3-031-28790-9_3

Hussain, W., Fong, M., & Spady, W. G. (2024). Digital Developmental Advising Systems for Engineering Students Based on Accreditation Board of Engineering and Technology Student Outcome Evaluations. *Information*, *15*(9), 520. https://doi.org/10.3390/info15090520

Jaradat, A., Almasaeid, H., & Alzubaidi, M. A. (2022). A Novel Framework to Monitor and Test the Performance of Mobile Applications. *International Journal on Communications Antenna and Propagation (IRECAP)*, *12*(1), 20. https://doi.org/10.15866/irecap.v12i1.21497

Listiani, T. (2022). *The development of educational research statistics teaching materials using the ADDIE model*. 030005. https://doi.org/10.1063/5.0103201

Mahzari, M., AlNahedh, T., Ahmed, A. A., Al Rumyyan, A., Shaban, S., & Magzoub, M. E. (2023). Practical Guide to Undergraduate Medical Curriculum Alignment and Mapping. *Advances in Medical Education and Practice*, *Volume 14*, 1001–1012. https://doi.org/10.2147/AMEP.S424815

Manarbek, G., & Kondybayeva, S. (2024). Quality Assurance Practices in Higher Education: Lessons from the U.S. and Implications for Kazakhstan. *Journal of Higher Education Policy And Leadership Studies*, *5*(3), 66–86. https://doi.org/10.61186/johepal.5.3.66

Niemelä, M. (2022). Subject matter specific curriculum integration: a quantitative study of finnish student teachers' integrative content knowledge. *Journal of Education for Teaching*, *48*(2), 228–240. https://doi.org/10.1080/02607476.2021.1989288

Niemelä, M. A. (2021). Crossing curricular boundaries for powerful knowledge. *The Curriculum Journal*, *32*(2), 359–375. https://doi.org/10.1002/curj.77

Noor, N. M. M., Mamat, N. F. A., Mohemad, R., & Mat, N. A. C. (2023). Systematic Review of Rubric Ontology in Higher Education. *International Journal of Advanced Computer Science and Applications*, *14*(10), 147–155. https://doi.org/10.14569/IJACSA.2023.0141016

Romanowski, M. H. (2022). Internationalization and CAEP accreditation: replicating US teacher education programs abroad. *Teaching Education*, *33*(4), 404–418. https://doi.org/10.1080/10476210.2021.1948991

Salto, D. J. (2023). Capacity and willingness in higher education accreditation: when incentives are not enough. *Studies in Higher Education*, *48*(4), 538–550. https://doi.org/10.1080/03075079.2022.2148158

Shakirova, D. (2023). What is the current state of Intelligent Systems Applications in digital pedagogy?: In the example of English for Specific Purposes. *Proceedings of the 7th International Conference on Future Networks and Distributed Systems*, 448–452. https://doi.org/10.1145/3644713.3644778

Shaltry, C. (2020). A new model for organizing curriculum alignment initiatives. *Advances in Physiology*

Education, *44*(4), 658–663. https://doi.org/10.1152/advan.00174.2019

Sholichin, S. (2021). Pengembangan dan Pengujian Aplikasi Pemesanan Makanan berbasis Website Menggunakan Metode Waterfall. *Journal of Computer Science and Engineering (JCSE)*, *2*(1), 40–50.

Singh, S., & Singh, V. (2023). *General and Discipline-Specific Challenges to Implementing Outcome-Based Education in India* (pp. 108–127). https://doi.org/10.4018/978-1-6684-9472-1.ch007

Stauffer, M. (2023). *Laravel: Up & Running*. " O'Reilly Media, Inc."

Sumathi, D. R., Savithramma, D. R. M., & B P, D. A. (2024). A Systematic Framework for Designing and Implementing Outcome-Based Curriculum in Engineering Education: A Comprehensive Approach. *Journal of Engineering Education Transformations*, *37*(IS2), 216–224. https://doi.org/10.16920/jeet/2024/v37is2/24043

Sun, P. H., & Lee, S. Y. (2020). THE IMPORTANCE AND CHALLENGES OF OUTCOME-BASED EDUCATION â€" A CASE STUDY IN A PRIVATE HIGHER EDUCATION INSTITUTION. *Malaysian Journal of Learning and Instruction*, *17*. https://doi.org/10.32890/mjli2020.17.2.9

Svetsky, S., Moravcik, O., Mikulowski, D., Galambos, P., & Kotyrba, M. (2023). *Experience with an Interdisciplinary Approach to Removing Barriers Related to IT Personalized Support for Teachers in the Creation and Transmission of Educational Content* (pp. 680–691). https://doi.org/10.1007/978-3-031-26876-2_64

Winarni, E. W. (2021). *Teori dan Praktik Penelitian Kuantitatif, Kualitatif, PTK, R & D*. Bumi Aksara.

Yadav, P., Tomar, A., Soni, R., Dubey, G., Bhargava, C. P., & Kumari, J. (2024). Metrics With Performance Indicators Used For Calculating the Mapping Strength of Course Outcome With Program Outcome. *Journal of Engineering Education Transformations*, *38*(2), 85–95. https://doi.org/10.16920/jeet/2024/v38i2/24192

Zhang, R. (2024). Construction and Evaluation of Digital Resource Management Platform for Physical Education in Colleges and Universities. *Applied Mathematics and Nonlinear Sciences*, *9*(1). https://doi.org/10.2478/amns-2024-3272

Zhao, L., & Fan, W. (2023). Conception, Features, and Framework of Curriculum and Instruction Integration. *Education Research International*, *2023*, 1–9. https://doi.org/10.1155/2023/8728567