Review Article

Analysis of Teaching Material Delivery Techniques by Lecturers Based on E-Learning at Universitas Pembangunan Panca Budi Medan

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Abstract: The rapid development of technology has also affected the world of education, both in terms of facilities, infrastructure, and learning methods. Schools and universities now utilize technology to support the teaching and learning process, making it more efficient, interesting, and accessible. Technology acts as a means, media, and learning resources that help facilitate learning between educators and students. One form of technology application in education is the use of videos and E-Learning-based learning portals. At Universitas Pembangunan Panca Budi, the E-Learning system continues to be developed in terms of features, security, and interface to support effective distance learning between students and lecturers.

Keywords: Educational technology, E-Learning, website, online learning, learning media, learning video

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Citation: Fauziah, F., Mutia, C., Meiditra, I., Yuda, F., & Rahmansyah, R. (2025). Analysis of teaching material delivery techniques by lecturers based on e-learning at Universitas Pembangunan Panca Budi Medan. *Iota*, 5(2). https://doi.org/10.31763/iota.v5i2.908

Academic Editor: Adi, P.D.P

Received: April 09, 2025

Accepted: April 21, 2025

Published: May 15, 2025

Publisher's Note: ASCEE stays neutral about jurisdictional claims in published maps and institutional affiliations.

1. Introduction

The education always develops along with the development of the world. Likewise, educational facilities and infrastructure are increasingly adequate and more complete (Nilfa et al., 2024). If in the past schools used facilities that were as they were, now they are more complete. So that learning can be carried out optimally. Likewise, the media used in the teaching and learning process is increasingly complex.

Technological developments eventually also penetrated the world of education. Many schools and universities are now using this technology to facilitate and facilitate learning in high schools and universities in Indonesia (Trinto et al., 2024). Technology in learning can be a learning tool, method/media, and a learning resource for students. As a means of technology is a tool to facilitate learning. As a method/media technology as an innovator so that learning becomes more interesting. Meanwhile, as a learning resource, technology is one of the information providers for students (Shahnyb et al., 2024).

Among the many learning technologies are video, and E-Learning-based learning portals. As one of the media, video/film is one of the learning technologies that have good advantages for the implementation of learning, to facilitate and accelerate the delivery of information between lecturers and students (Prasetyo & Wantoro, 2024).

By using E-Learning, students and lecturers can easily connect and conduct online learning anytime and anywhere, therefore E-Learning-based learning system is increasingly developed to facilitate its use. Users are only required to register their account at the E-Learning Bureau office which will be used to enter the E-Learning system. Until now the E-Learning system at Universitas Pembangunan Panca Budi is increasingly developed in terms of features, security, and interface appearance and it is hoped that in the future this system will be used for distance learning between students and lecturers. (Y. K. Al-Rikabi and G. Ali Montazer, 2023).

2. Theory

2.1 E-Learning System and its development

E-learning is an educational system or concept that utilizes information technology in the teaching and learning process. (Yazid et al., 2024) One of the media used to conduct the teaching and learning process using E-Learning is a computer or laptop connected to the internet network, as well as a user and password used to enter the E-Learning system (Bernal, 2024).

The Four characteristics of E-Learning consist of:

- Utilizing electronic technology services, where teachers and students, students and students, or teachers and fellow teachers can communicate relatively easily without being limited by protocol.
- Utilizing computer advantages (digital media and computer networks).
- Using independent teaching materials that can be stored on a computer so that they can be accessed by teachers and students anytime and anywhere if they need it.
- Utilizing learning schedules, curriculum, learning progress results, and matters relating to educational administration that can be viewed at any time on the computer. (A. Mansouri, 2024), (M. Ghaffari., et.al 2024).

2.2 Internet Server and Utilities

The Internet is a computer network that is interconnected using a global standard transmission control protocol/internet protocol suite (TCP/IP) system that is used as a packet exchange protocol in serving billions of users around the world. Internet is short for interconnected networks (Budiani et al., 2023). The Internet can also be interpreted as an open global communication network that connects millions or billions of computer networks of various types and types, using communication types such as telephone, satellite, and so on. Moreover, specifically an internet server is a computer designed to provide services, data, and other resources to a large number of different computers called computer clients through an internet network. The functions of the internet server are to store and transmit data, process requests such as connections to websites, applications, or servers, and provide fast responses. Then manage data traffic. There are several types of internet servers including Web Server, Email Server, Database Server, File Server, Game Server, and DNS Server.

2.3 Flexible and Dynamic Websites

Website is often also called the Web, which can be interpreted as a collection of pages that display various kinds of text information, data, still or moving images, animated data, sound, video, or a combination of all of them, both static and dynamic, which form a series of interrelated buildings where each is connected by a network of pages or hyperlinks. (Fauziah et al., 2024). A dynamic website is a website whose content can change automatically based on the interaction of the user. This is different from the static web. Dynamic websites are also able to be integrated into mobile displays so that they will be more easily accessed by end-users.

The characteristics of dynamic websites are that they can change content easily, have high interactivity or dynamic user interface, and have CRUD (Create, Read, Update, and Delete) connections. Some of the technologies used in dynamic websites are PHP, ASP.Net, Node.js, Python, Ruby, and Java. On the client side, for example, javascript, AJAX, jQuery, React/Vue/Angular. The databases used are MySQL, PostgreSQL, Oracle, and SQL Server.

3. Method

3.1 Analysis of Teaching Material Delivery Techniques Overall

This research uses a descriptive qualitative approach to analyze the technique of delivering teaching materials by lecturers through an E-Learning platform, (B. V. Babu., et.al. 2024), (A. Arbab., et.al, 2024), (B. E. Arockiam., et.al, 2024), (L. Homayouni., et.al, 2024. Data was collected through an in-depth interview method, direct observation of learning activities on the E-Learning platform, and documentation of teaching materials used by lecturers. Informants in this research are lecturers from various study programs who actively use the E-Learning system at Universitas Pembangunan Panca Budi. The data analysis technique was conducted inductively with the stages of data reduction, data presentation, and conclusion drawing, to describe patterns of effective delivery techniques and challenges faced by lecturers in the online learning process (Budiani et al., 2023). Figures 1, 2, and so on are the overall flowcharts in the system built in this research. Specifically, the system that can be built in this research is shown in Figure 1, where the problem is identified by using a clear Research Objective and also sufficient literature studies, then continued with Research Design and data collection from informants about website performance, in detail can be seen in Figure 1.

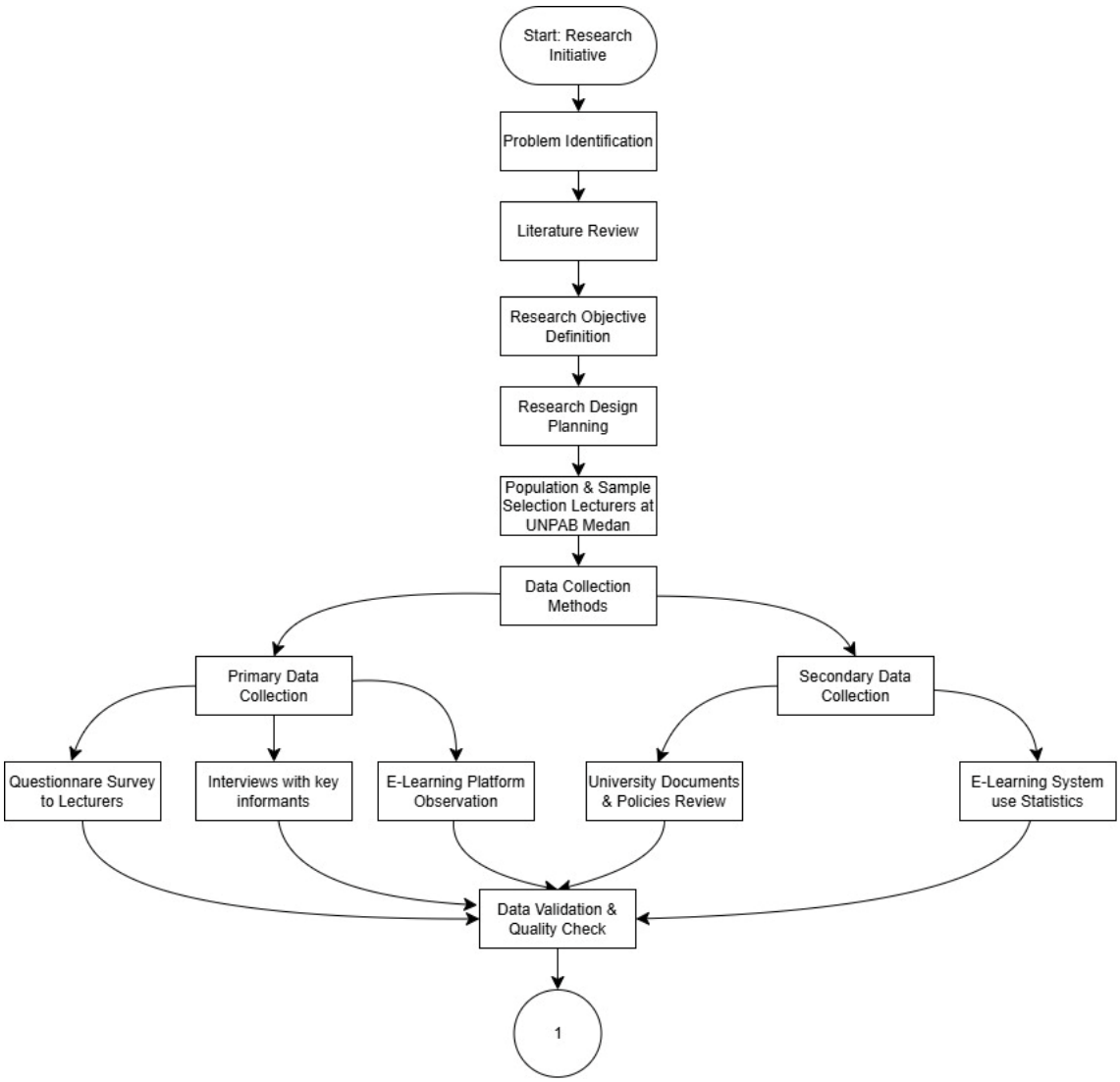

Figure 1. Flowchart System 1 (Analysis of Teaching Material Delivery Techniques Overall)

Furthermore, a data analysis is needed to analyze in detail the type of research whether Quantitative or Qualitative by using detailed statistical analysis and thematic analysis. Then formulate teaching materials in synchronous, asynchronous, or blended learning, after that an analysis of the effectiveness of the assessment can be carried out. In this research, it is not in detail to do all these steps because it focuses on the system that will be built to meet all the components needed in this research. Details can be seen in Figure 2, and more specific to the final stages in Figure 3.

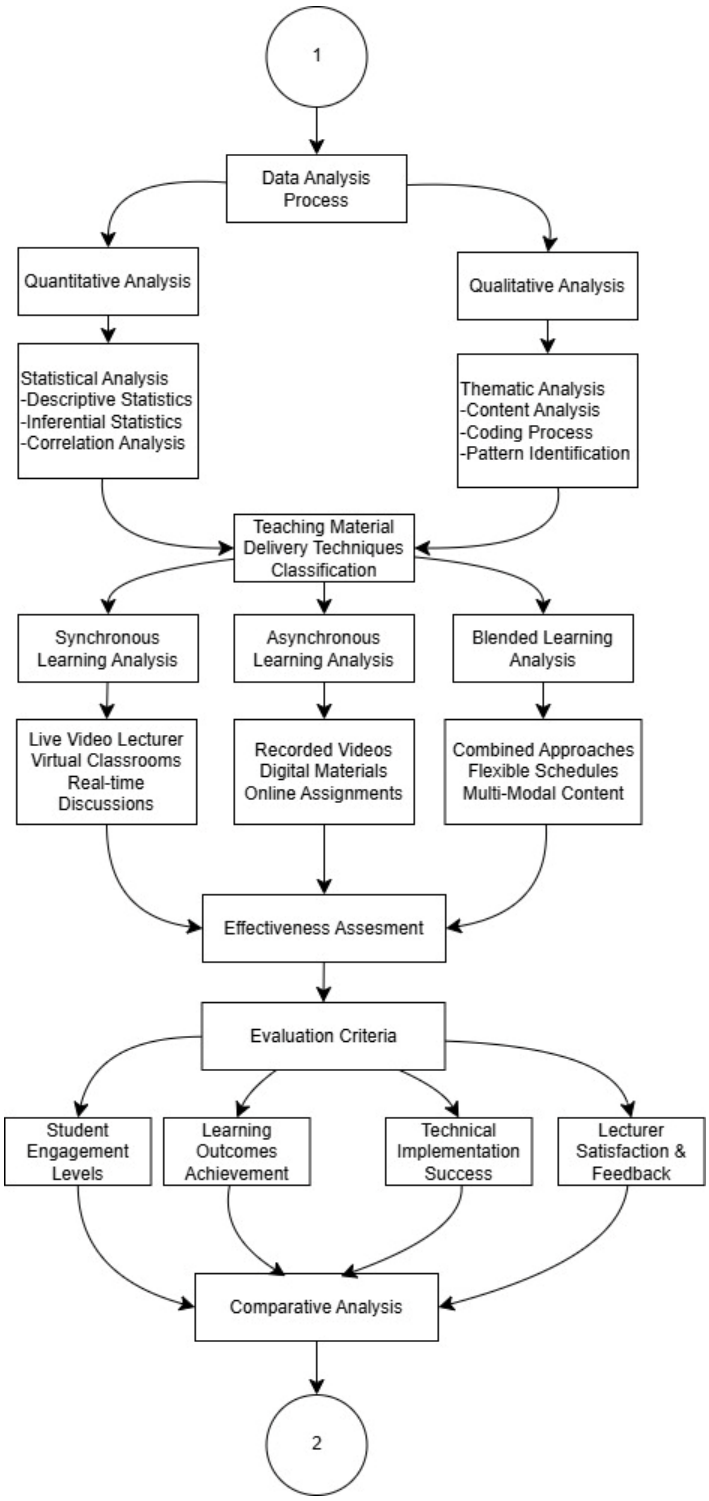

Figure 2. Flowchart System 2 (Analysis of Teaching Material Delivery Techniques Overall)

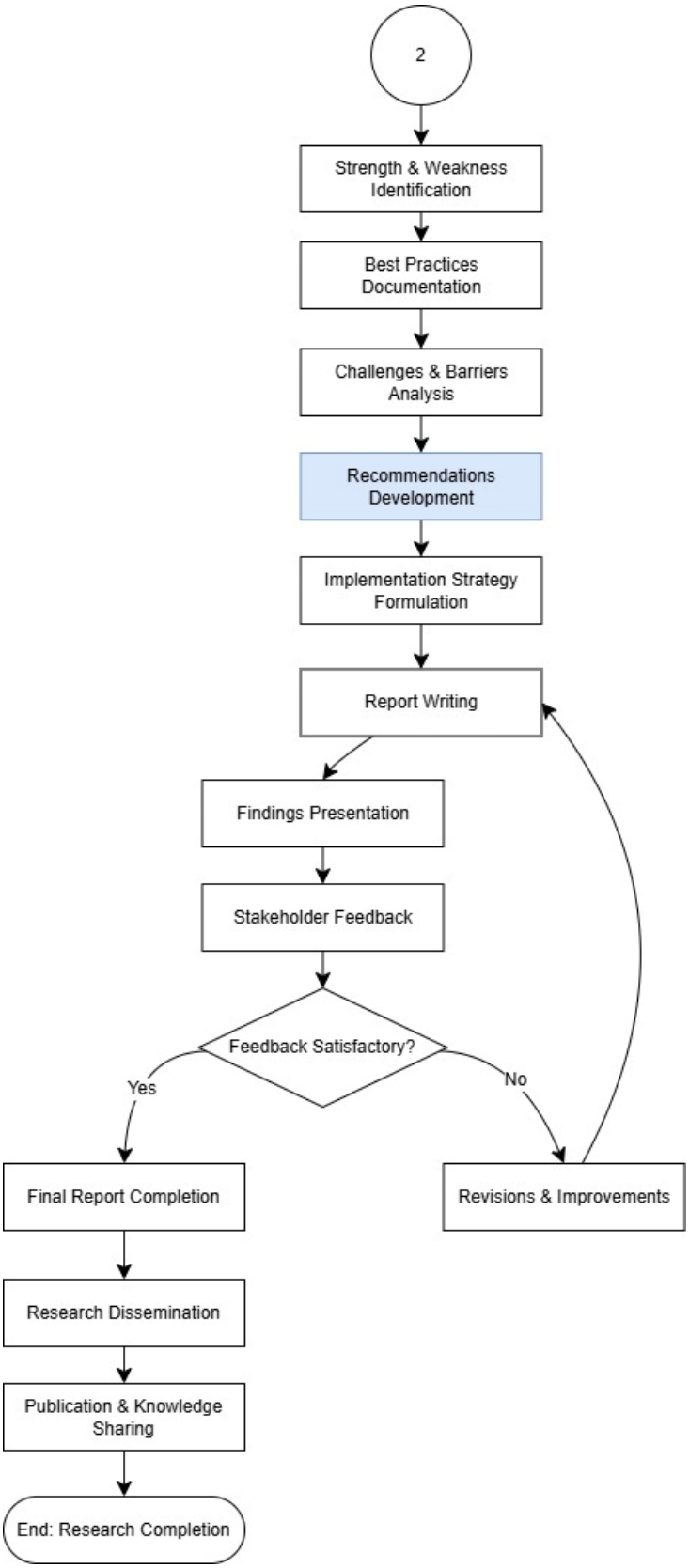

Figure 3. Flowchart System 3 (Analysis of Teaching Material Delivery Techniques Overall)

3.2 Specific Flowchart to enter the system

Moreover, after the Comparative analysis process, the next step is the process of identifying weaknesses and strengths that can be specifically analyzed comprehensively. But if no significant results are found, then improvements are needed with new methods and formulas, after which the reporting and evaluation process is carried out again until effectiveness and improvement are found from before. Specifically and completely can be seen in Figure 3.

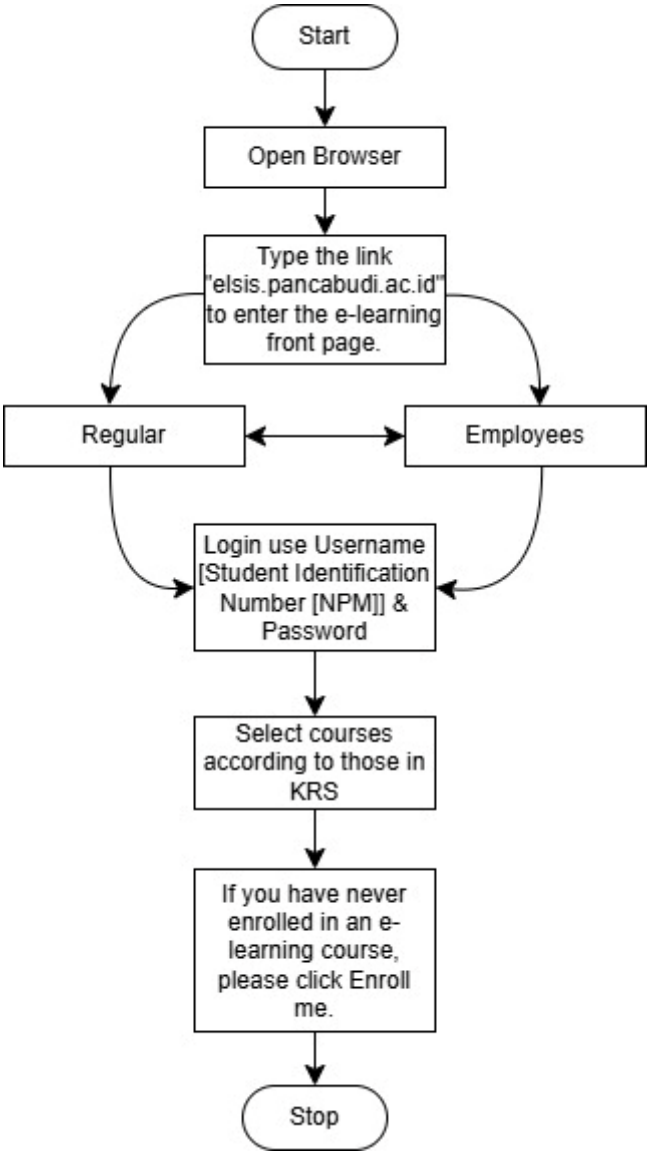

Figure 4. Flowchart Specifically to enter the system

Furthermore, the flow map that is running on E-Learning Universitas Pembangunan Panca Budi is as follows in Figure 5, consists of three parameters namely Admin, Lecturer, and Student with components of Login Data, Login Data Input, Elearning Database, data materials, and material connectivity.

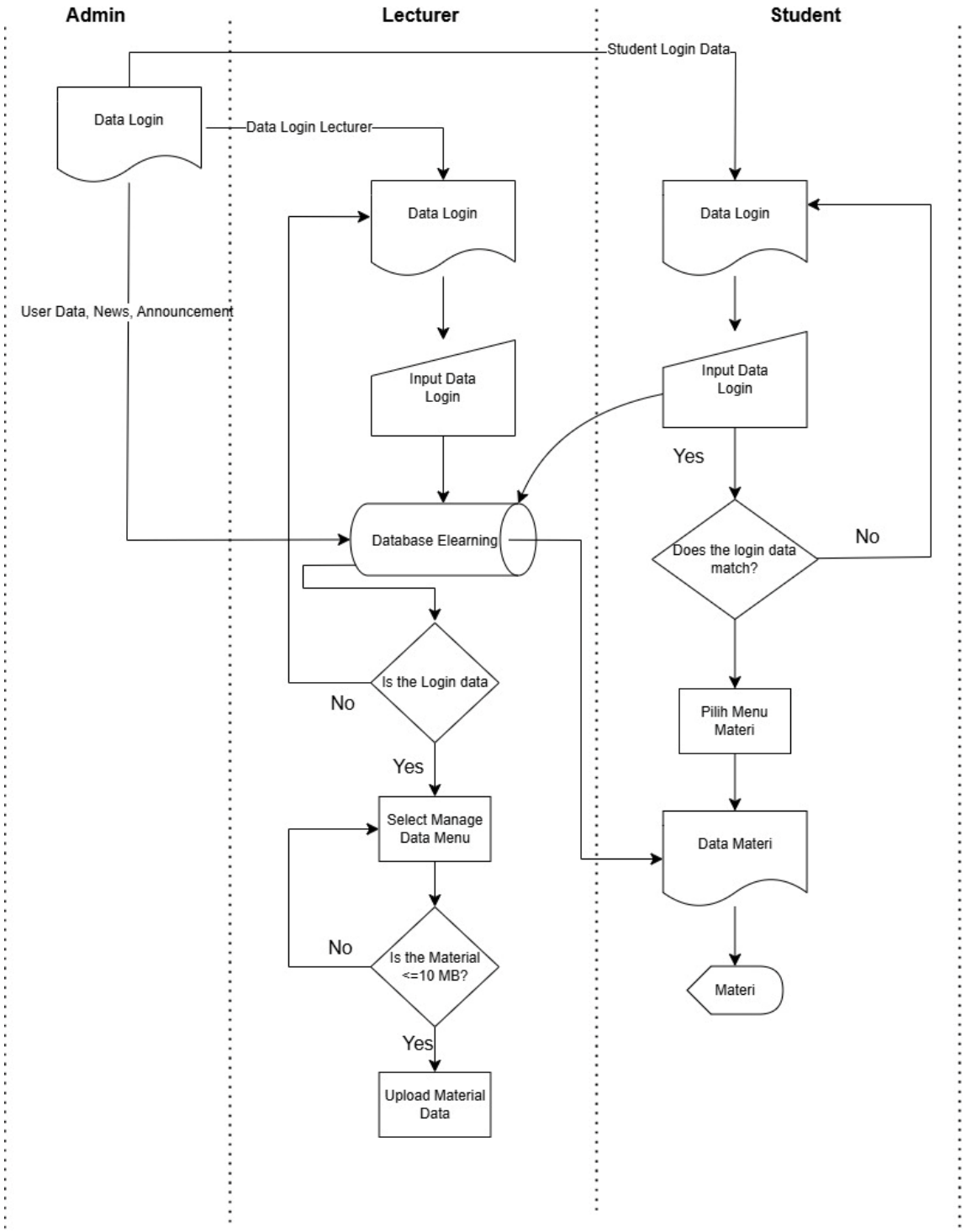

Figure 5. Flowmap of How the E-Learning System Works

3.3 Context Diagram

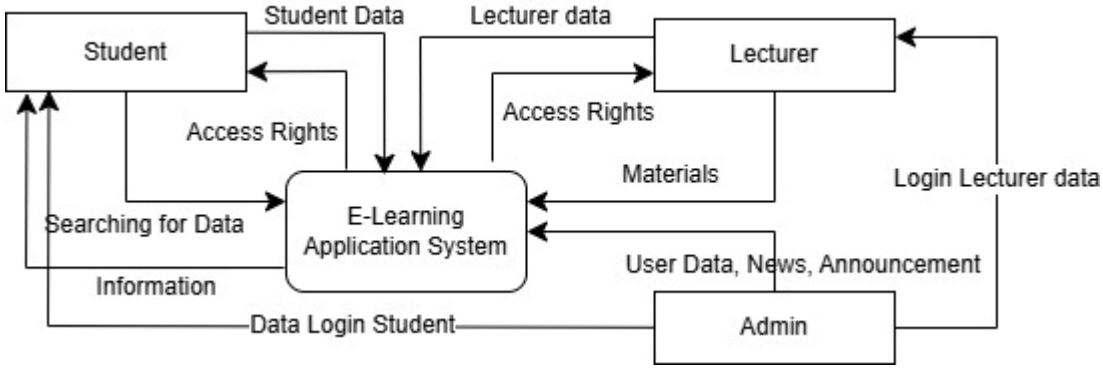

Figure 6. Context Diagram

Furthermore, the highest level of data flow diagram in Figure 6 describes input to output or from the system.

The following is an explanation of the context diagram above:

1. Admin will input user data such as username and password into the database
2. Lecturer and student data will be entered into the E-Learning database system), (H. Eljak et al., 2024), (A. Derbas., et.al, 2023), (F. Škopljanac-Mačina, et.al, 2024).
3. After the lecturer and student data is successfully entered, students will be given access rights to the system in the form of ID and password.
4. The lecturer will provide material and enter into the system
5. Lecturers and students who already have access rights can access data in the system.
6. The system will provide information as requested.

The explanation of DFD level 0 in Figure 7:

- Students will provide data in the form of a username and password to the administrator
- Data will be validated in the database
- Admin will save student data to the database
- Student data in the database will be used as an ID when accessing the website
- Administrator inputs material into the website
- An administrator can freely give access permission rights to each student
- Students who get access permission rights can access material on the website
- Students can search for material on the website that is taken based on the keywords they are looking for
- The system will display the material in question to students
- Information about the material is stored by the admin in the database which will be managed by the admin in its form and appearance.
- Students will get information that was previously managed by the administrator.

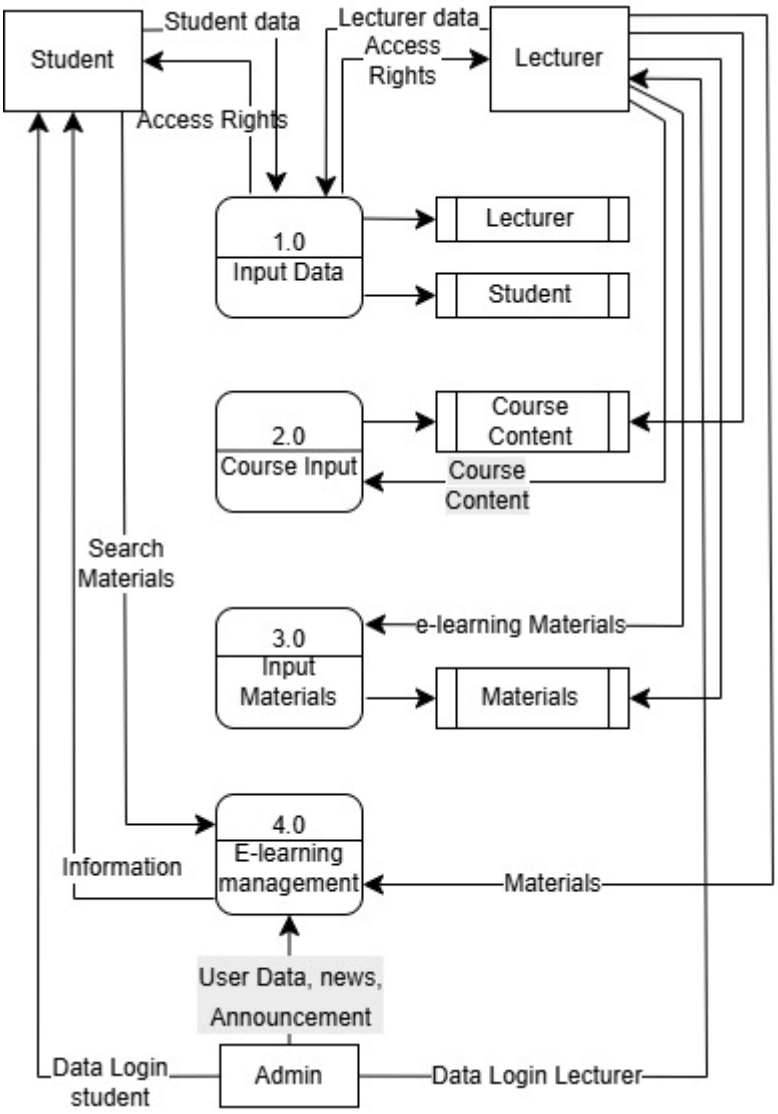

Figure 7. DFD Level 0 for e-learning system

4. Result and Discussion

4.1 Analysis of E-Learning Usage Methods

The use of e-learning is based on the fact that conventional learning in some aspects is considered less supportive when compared to modern teaching that uses e-learning. E-learning is not necessarily used as a substitute for conventional teaching but integrated functions as a supplement to conventional teaching materials. Related to its function as a supplement supporting conventional learning methods, there are various elements contained in the E-Learning system, among others:

- Materials can be provided in the form of modules, questions are provided and the results of the work can be displayed.
- Students can develop online communities for mutual support and information.
- Teachers are always online to provide guidance to students, answer questions, and assist in discussions.

- There is software that can organize online meetings so that learning can be done simultaneously or in real time without distance constraints.
- The use of audio and video technology, in the delivery of material to attract interest in learning such as telephone, voice mail telephone, online radio, audio, video text, and video messaging.

4.2 Learning Management System

One of the most important E-Learning tools is the Learning Management System (LMS). LMS is a package of solutions designed for delivering, tracking, reporting, and managing learning materials, as well as monitoring the progress and interaction of learners. Learning Management System is a software application for teaching and learning activities online (connected to the internet), such as administration, documentation, and report making of teaching and learning process activities, materials taught are provided online web-based and can be accessed via the internet (Martin, 2008). In essence, LMS is an application that automates and virtualizes the teaching and learning process electronically.

LMS also provides features that can meet all the needs of users in terms of the learning process. Currently, there are many types of LMS offered, each type of LMS has its features according to the facilities that have been provided. LMS can contain materials that are packaged in the form of multimedia (text, animation, video, sound), which is given as a supplement and enrichment for the development of learner competencies. LMS offers an innovative learning system that covers the field of information technology, especially virtual-based through web online learning, multimedia, and video conferences. Web-based learning LMS is developed dynamically (dynamic E-Learning).(Wulandari & Tohir, 2024).

Moreover, the general functions that a Learning Management System (LMS) should have include:

- Publishing and sharing materials: LMS provides services to facilitate the process of publishing teaching materials. Instructors will upload teaching materials according to the syllabus that has been made, it can be in the form of material notes, articles, quizzes, assessments, and others.
- Forum and chart: online forum and chat is a two-way communication between instructors/lecturers and their students, either synchronously (char), or asynchronously (forum, email). These facilities allow learners to write their responses, and discuss them with their peers.
- Quizzes and surveys: online quizzes and surveys can provide instant grades for learners. This is an excellent tool to use to get immediate feedback from learners according to their ability and absorption.
- Gathering and reviewing assignments: results obtained from evaluating/monitoring the success of learning, namely giving grades or scores to students automatically and online.

4.3 Login Process Flow into the E-Learning System

The process flow of logging into the e-learning system is fairly easy to do, even for laymen. Moreover, entering the e-learning system dashboard, one can use a web browser such as Google Chrome, Mozilla Firefox, Opera, UC Browser, and other browsers. Specifically, the system built in this research will be shown in the following The flowchart shown in Figure 4 is step-by-step, while the design can be seen in Figure 5. Furthermore, Figures 8, 9, and 10 are examples of e-learning systems at Universitas Pembangunan Panca Budi.

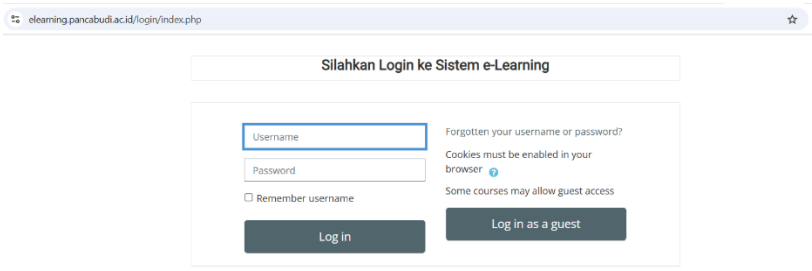

Figure 8. Login System elearning.pancabudi.ac.id

Figure 9. Help with Book or PDF-based e-Learning systems

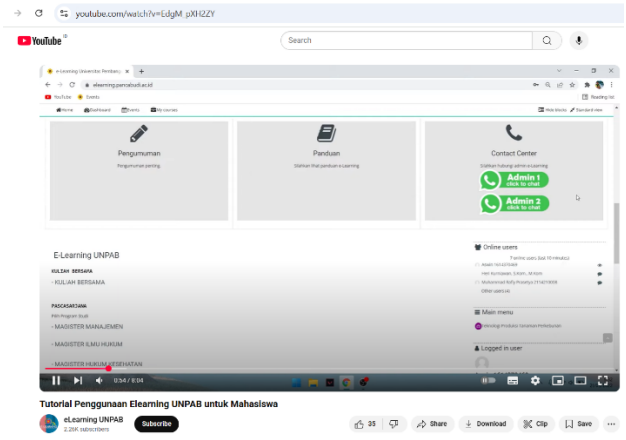

Figure 10. help to learn E-Learning using videos uploaded on YouTube

5. Conclusion

It can be concluded that E-learning is an educational system or concept that utilizes information technology in the teaching and learning process. The difference between face-to-face learning and the E-learning method is that in the face-to-face method, a teacher is considered a person who knows everything and is assigned to channel his knowledge to students. Whereas in the E-Learning method, a student is required to be independent at a certain time and responsible for his/her learning. The E-Learning

learning atmosphere will 'force' the learner to play a more active role in their learning. The learner designs and searches for materials with effort and initiative.

Acknowledgments: Thanks to all lecturers, students, and colleagues at the Rokan Hilir Institute of Technology, Rokan Hilir Regency, Riau, Indonesia, who have worked hard to complete this research, hopefully, it can be of great benefit to the development of the world of information systems, especially at the education level.

Author contributions: The authors are responsible for building Conceptualization, Methodology, analysis, investigation, data curation, writing—original draft preparation, writing—review and editing, visualization, supervision of project administration, funding acquisition, and have read and agreed to the published version of the manuscript.

Funding: The study was conducted without any financial support from external sources.

Availability of data and Materials: All data are available from the authors.

Conflicts of Interest: The authors declare no conflict of interest.

Additional Information: No Additional Information from the authors.

References

[1] Bernal, M. E. (2024). Revolutionizing eLearning Assessments: The Role of GPT in Crafting Dynamic Content and Feedback. Journal of Artificial Intelligence and Technology, 4(3), 188–199. https://doi.org/10.37965/jait.2024.0513

[2] Budiani, R. E., Irawan, J. D., & Rudhistiar, D. (2023). Sistem Monitoring Penyiraman Otomatis Pada Tanaman Cabai Berbasis Internet Of Things (IoT). Prosiding Seminar Nasional Rekayasa Keteknikan & Informatika, 8(Senarai), 140.

[3] Fauziah, Yuda, F., Puspita, R., Mutia, C., Informasi, S., & Informasi, S. (2024). Analisis dan perancangan sistem informasi produksi buah kelapa sawit berbasis web pada koperasi mekar jaya. 10(2), 88–98.

[4] Martin, F. (2008). Blackboard as the learning management system of a computer literacy course. Journal of Online Learning and Teaching, 4(2), 138–145. http://libres.uncg.edu/ir/uncw/f/martinf2008-1.pdf

[5] Nilfa, A., Sidin, U. S., & Mahande, R. D. (2024). Pengembangan E-Modul Berbasis Hypercontent pada Mata Kuliah E-Learning Program Studi Pendidikan Teknik Informatika dan Komputer. 02(1), 1174–1183. https://ojs.smkmerahputih.com/index.php/jimu/article/view/514

[6] Prasetyo, G. A., & Wantoro, J. (2024). E-Learning Mata Pelajaran Informatika melalui Model Problem Based Learning berbasis Moodle. Edumatic: Jurnal Pendidikan Informatika, 8(1), 65–74. https://doi.org/10.29408/edumatic.v8i1.25264

[7] Shahnyb, N., Amalia, F., & Irfany, I. (2024). Analisis Perbandingan Aplikasi Zoom Cloud Meetings Dan Microsoft Teams Dalam Penerapan E-Learning Sebagai Media Komunikasi Jarak Jauh. CORE: Journal of Communication Research, 56–68. https://journal.unpacti.ac.id/index.php/CORE/article/view/1503

[8] Trinto, R., Nurjanah, N., Herwanto, H. W., Kejuruan, P., Pascasarjana, S., & Malang, U. N. (2024). Pengembangan E-Learning Sebagai Media Pembelajaran Inovatif. 9(4), 841–850.

[9] Wulandari, O., & Tohir, A. (2024). Penggunaan Learning Management System (Lms) Dalam Meningkatkan Kualitas Pembelajaran Daring Di Perguruan Tinggi. Review Pendidikan Dan Pengajaran, 7(3), 10490–10496.

[10] Yazid, M. A., Haryanto, A., Mahfudz, A. Z., & Billah, A. (2024). Implementasi Penggunaan Media E-Learning dalam Pembelajaran : Strategi dan Inovasi. 4(2), 115–129.

[11] Y. K. Al-Rikabi and G. Ali Montazer, "Extracting the main aspects of e-Learning readiness assessment for Iraqi universities," 2023 10th International and the 16th National Conference on E-Learning and E-Teaching (ICeLeT), Tehran, Iran, Islamic Republic of, 2023, pp. 1-5, doi: 10.1109/ICeLeT58996.2023.10139868.

[12] A. Mansouri, A. Gholami and R. Gavagsaz-Ghoachani, "Educating Curricular Elements with Olfactory Symbols in e-Learning," 2024 11th International and the 17th National Conference on E-Learning and E-Teaching (ICeLeT), Isfahan, Iran, Islamic Republic of, 2024, pp. 1-5, doi: 10.1109/ICeLeT62507.2024.10493102.

[13] M. Ghaffari, A. Akbari and M. M. Ostani, "A User Experience Study on University of Isfahan's LMS and Exploring Features of AI-Enhanced E-Learning Platforms," 2024 11th International and the 17th National Conference on E-Learning and E-Teaching (ICeLeT), Isfahan, Iran, Islamic Republic of, 2024, pp. 1-5, doi: 10.1109/ICeLeT62507.2024.10493098.

[14] B. V. Babu, S. S. Aravinth, K. Gowthami, P. Navyasri, A. Jivitha and T. Yasaswini, "Enhancing Personalized Learning

Experiences by Leveraging Deep Learning for Content Understanding in E-Learning Recommender Systems," 2024 International Conference on Computing and Data Science (ICCDS), Chennai, India, 2024, pp. 1-6, doi: 10.1109/ICCDS60734.2024.10560438.

[15] A. Arbab, A. Shatat and A. Aldada, "Navigating the Digital Landscape: Addressing Challenges in E-Learning for the Modern Era," 2024 ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS), Manama, Bahrain, 2024, pp. 962-965, doi: 10.1109/ICETSIS61505.2024.10459474.

[16] B. E. Arockiam, R. Parupalli, B. Vijayalakshmi and H. Anupama, "Identification of learning attitude by grouping using K-Prototypes clustering for Learner motivational activities in E-Learning–an Implementation," 2024 IEEE 6th International Conference on Cybernetics, Cognition and Machine Learning Applications (ICCCMLA), Hamburg, Germany, 2024, pp. 45-49, doi: 10.1109/ICCCMLA63077.2024.10871666.

[17] L. Homayouni, Y. Hejazi and N. Zarifsanaiey, "A Review of Ethical Considerations in Using Artificial Intelligence in E-Learning," 2024 11th International and the 17th National Conference on E-Learning and E-Teaching (ICeLeT), Isfahan, Iran, Islamic Republic of, 2024, pp. 1-6, doi: 10.1109/ICeLeT62507.2024.10493100.

[18] H. Eljak et al., "E-Learning-Based Cloud Computing Environment: A Systematic Review, Challenges, and Opportunities," in IEEE Access, vol. 12, pp. 7329-7355, 2024, doi: 10.1109/ACCESS.2023.3339250.

[19] A. Derbas, N. Al-Ramahi, A. Hnaif, T. Ahmad Alrawashdeh and R. Adnan Mubaideen, "The Effectiveness of E-Learning System on Students' of Al-Zaytoonah university of Jordan: A Case Study," 2023 International Conference on Information Technology (ICIT), Amman, Jordan, 2023, pp. 459-463, doi: 10.1109/ICIT58056.2023.10226073.

[20] F. Škopljanac-Mačina, I. Zakarija and B. Blašković, "Analysis of e-Learning System Usage Before and After the COVID-19 Pandemic," 2024 47th MIPRO ICT and Electronics Convention (MIPRO), Opatija, Croatia, 2024, pp. 613-618, doi: 10.1109/MIPRO60963.2024.10569333.