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Managing Personalization and Collaboration in Education: A Systematic Review of Educational Practices

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Abstract:

This systematic literature review analyzes 20 carefully selected documents from the Scopus database. This study explores ways that align with Islamic educational management's principles to balance personalized learning outcomes and community empowerment in academic settings. The selection of documents is based on relevance to the focus and recent developments in Islamic education. The qualitative analysis method uses thematic coding and VOS Viewer. The analysis results indicate that Islamic approaches like collaboration, reflection, and feedback can achieve balanced learning outcomes. Collaborative filtering helps select learning materials according to student's needs, while reflection and feedback strengthen positive interactions and ukhuwah within the learning community. In addition, computer-based learning and e-learning allow students to learn at their own pace. A flexible curriculum allows for adjustments to students' interests by the principle of *taysir* (making it easy). These findings recommend that educational institutions integrate a multifaceted approach to create an inclusive, adaptive, and Islamic-oriented learning environment.

Keywords: *Educational Management, Personalized Learning, Collaboration, Social Skills*

Abstrak:

Systematic literature review ini menganalisis 20 dokumen yang dipilih secara cermat dari database Scopus. Penelitian ini bertujuan untuk mengeksplorasi cara-cara yang sejalan dengan prinsip manajemen pendidikan Islam dalam mencapai keseimbangan antara hasil belajar yang dipersonalisasi dan penguatan komunitas di lingkungan pendidikan. Pemilihan dokumen didasarkan pada relevansi dengan fokus tersebut, serta perkembangan terbaru dalam pendidikan Islam. Metode analisis kualitatif menggunakan pengkodean tematik dan VOS Viewer. Hasil analisis menunjukkan bahwa pencapaian hasil belajar yang seimbang dapat dicapai melalui pendekatan Islami, seperti kolaborasi, refleksi, dan umpan balik. Penyaringan kolaboratif membantu memilih materi pembelajaran sesuai kebutuhan siswa, sementara refleksi dan umpan balik memperkuat interaksi positif serta ukhuwah di dalam komunitas belajar. Selain itu, pembelajaran berbasis komputer dan e-learning memberikan fleksibilitas bagi siswa untuk belajar sesuai dengan kecepatan mereka. Kurikulum fleksibel memungkinkan penyesuaian terhadap minat siswa, sesuai dengan prinsip *taysir* (memudahkan). Temuan ini merekomendasikan agar institusi pendidikan mengintegrasikan pendekatan multifaset untuk menciptakan lingkungan belajar yang inklusif, adaptif, dan berorientasi pada nilai-nilai Islam.

Kata Kunci: *Manajemen Pendidikan, Pembelajaran Dipersonalisasi, Kolaborasi, Keterampilan Sosial*

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INTRODUCTION

Education systems today face challenges in balancing personalized and collaborative learning approaches, which are essential for developing well-rounded individuals (Rogosic et al., 2020). Personalized learning, while catering to individual needs and learning styles, can inadvertently reduce opportunities for social interaction and collaboration, both of which are critical for fostering teamwork and communication skills. Conversely, overemphasizing collaborative learning may overlook the unique needs of students, leading to disengagement and suboptimal learning outcomes. This imbalance in educational practices can result in disparities in student achievement and hinder the development of essential competencies needed for active participation in society. Addressing these challenges requires a learning approach that not only improves individual well-being but also prepares students for collective contribution to the progress of society (Hanushek & Woessmann, 2020).

As times have evolved, learning approaches have significantly transformed from conventional models to more adaptive and responsive models that meet individual needs and preferences (Khosravi et al., 2020). Personalized learning is often practiced using a differentiated instruction model, which places a strong emphasis on the unique interests of individual students, enabling them to optimally develop according to their natural abilities (Hasanah et al., 2023). This model requires teachers who are competent in subject matter, the use of media, and classroom management to adapt to students' needs.

From an Islamic education management perspective, while the ability of teachers to customize learning models to meet the unique needs of each student is a significant advancement, it requires thoughtful planning to ensure that essential elements of the learning process, such as collaboration and social interaction, are maintained. In line with the principles of *ukhuwah* (brotherhood) and *syura* (consultation), it is important to balance individualization with the collective development of the learning community. Previous research often neglects the role of classroom management in harmonizing personalized learning with the need to foster a sense of unity and collaboration, which are core values in Islamic educational settings (Christinawati et al., 2020; Fung, 2023). From the perspective of Islamic education management, this research seeks to bridge the gap between personalized and collaborative learning by exploring strategies that harmonize both approaches within the framework of Islamic values and principles. In Islamic education management, the ability to plan and manage adaptive learning strategies is vital in creating an environment that balances individual student needs with the development of a strong sense of community (*ukhuwah*) in the classroom. While previous studies have discussed the benefits of personalized and collaborative learning separately, there remains a gap in understanding how Islamic educational management can effectively integrate these two methods to ensure both personal growth (*tazkiyah*) and collective responsibility (*jama'ah*). This integration aims to support holistic development, fostering both intellectual and moral excellence, which are central goals of Islamic education.

RESEARCH METHODS

This research employed a Systematic Literature Review (SLR) (Carrera-Rivera et al., 2022), particularly suited for exploring the integration between personalized and collaborative learning due to its structured and methodical approach. Unlike meta-analysis, which focuses on quantifying and aggregating statistical data from previous studies, SLR comprehensively examines existing literature to identify patterns, gaps, and trends without requiring quantitative data. This method allows for a broader analysis of various studies and perspectives, crucial for understanding the nuanced interplay between personalized and collaborative learning approaches.

The SLR process involved several steps: first, Planning to Ensure Research Protocol: Ensuring consistency in procedures and review notes is crucial for establishing a reliable protocol. This phase involves defining the protocol, which outlines review procedures and documents activities. Seeking peer input enhances consistency and validity, helping to identify necessary modifications and ensure the review's relevance and reliability. The protocol aims to ensure replicability, which is crucial for maintaining accuracy and reliability. Second, Selection and Justification of Keywords and Synonyms: The selection of keywords and synonyms within the PICOC framework was critical to ensure the literature search was comprehensive and relevant. Keywords were chosen based on their direct relevance to the research objectives and their ability to capture a broad range of studies related to integrating personalized and collaborative learning. Synonyms were included to account for terminology variations and avoid missing relevant studies that might use different terms but address similar concepts. For this study, PICOC keywords were defined to address the balance between personalization and collaboration in learning experiences, as detailed in Table 1 below:

Table 1. PICOC Determination Process

	Main	(Synonyms)
Population	Learners	Students
Intevention	Personalized Learning	Inclusive learning strategies, Differentiated learning
Comparison	Collaborative Learning	Cooperative learning
Result	Learning Outcomes	Student engagement, Collaborative skills, Social skills
Context	Primary Education	Middle education

To mitigate potential bias, the selection process involved a systematic review of existing literature to ensure that all relevant terms were identified. A review of similar studies was conducted to verify that the chosen keywords and synonyms effectively captured the scope of research on personalized and collaborative learning. Additionally, the initial search results were reviewed and refined iteratively to address any emerging biases or gaps.

Formulating Research Questions

After the researcher has established the PICOC framework, the next step is to formulate the research questions that will serve as guidelines for conducting a

systematic literature review. The research questions are as follows: How can personalized learning be implemented in a balanced manner alongside collaborative learning?

Defining Inclusion and Exclusion Criteria

In When designing the inclusion and exclusion criteria for the systematic literature review on "Optimizing Learning: Seeking a Balance between Personalization and Collaboration in Learning Experience," we considered several factors relevant to the topic. The inclusion and exclusion criteria used are shown in Table 2.

Table 2. The Inclusion and Exclusion Criteria

No	Inclusion Criteria	Exclusion Criteria
1	Research that discusses personalization strategies in the context of learning.	Studies that do not focus on learning experiences or on either personalized or collaborative learning.
2	Studies exploring collaboration between students or between students and instructors in the learning experience.	Articles related to personalization or collaboration published outside Scopus-indexed journals.
3	Studies addressing the use of technology to support personalization and/or collaboration in learning.	Studies that do not cover learning aspects related to technology.
4	Articles published in peer-reviewed journals indexed by Scopus.	Literature not available in full-text format.
5	Research available in English.	Materials published as books, book chapters, or non-academic documents.

By using these inclusion and exclusion criteria, researchers can ensure that the studies included in this systematic literature review are relevant to the topic and meet the necessary scientific standards.

Determining the Search Platform

This SLR searches for articles on personalized and collaborative learning exclusively on the Scopus platform, as Scopus is a trusted journal platform among academics worldwide. Data Analysis Using Qualitative Data Analysis Methods. To facilitate the screening process, we limited the search to a specified time period. Based on the search results in the chosen database, using keywords: "personalized learning" OR "differentiated learning" OR "inclusion learning" OR "multicultural learning," it was found that the number of studies related to personalized learning has been increasing since 1981 (Rigsbee, 1981) up to 2024, with a total of 5,321 articles. Subsequently, the search was refined with the keywords "collaborative learning" OR "cooperative learning" OR "joint learning" OR "group learning" OR "team learning" OR "mutual cooperation learning," resulting in 207 documents that combine personalized learning with collaborative learning. Further filtering with the keywords "student learning motivation" OR "student engagement" OR "social skills" OR "learning outcomes" OR "student collaborative skill" identified 20 relevant documents. These articles were authored by researchers as follows:

Table 3. Documents Analyzed Based on Authors

No	Author	No	Author
1	Azevedo, B.F.(Azevedo et al., 2024)	11	Hamzah, F.(Hamzah et al., 2024)
2	Azevedo, B.F.(Azevedo et al., 2022)	12	Huang, S.(J. H. Zhang et al., 2018)
3	Krouska, A.(Krouska et al., 2022)	13	Kumar, J.A.(Kumar, 2021)
4	Troussas, C.(Troussas et al., 2020)	14	Yanjin (Yanjin et al., 2023)
5	Bai, H.(Bai, 2019)	15	Rebeirinha (Ribeirinha & Silva, 2021)
6	Barber, W.(Barber, 2015)	16	Zhang, Z (Z. Zhang et al., 2017)
7	Blumenstein, M.(Blumenstein, 2020)	17	Luo, L(Luo et al., 2017)
8	Chandrasekaran, R. (Chandrasekaran et al., 2019)	18	Lau (Lau et al., 2014)
9	Dai, Y. (Yang et al., 2017)	19	Zhao (Zhao et al., 2021)
10	Grenier, M.(Grenier & Yeaton, 2012)	20	Lashley (Lashley, 2017)

Table 3 lists the documents analyzed in the systematic literature review, categorized by the authors. Based on the types of documents that discuss personalized learning combined with collaborative learning, it is evident that these studies span various fields of science, as illustrated in Figure 1 below.

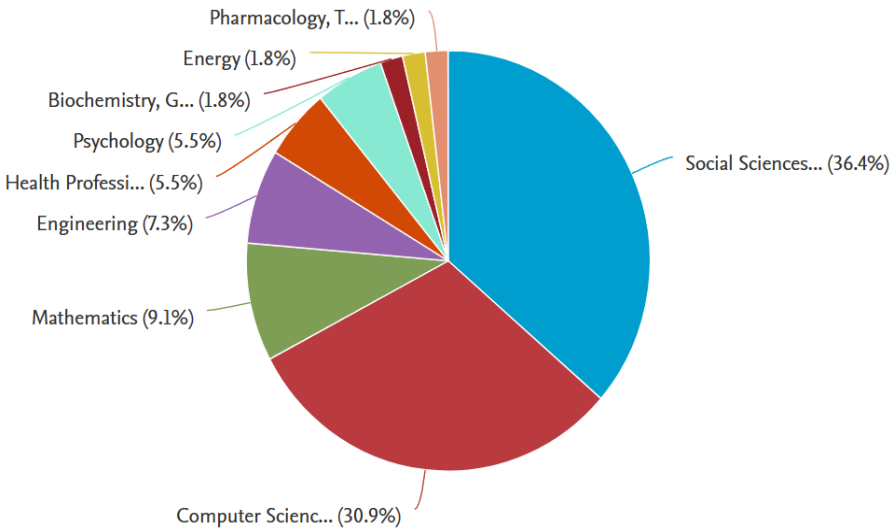

Figure 1. Distribution of Studies on Personalized and Collaborative Learning Across Different Fields of Science

The Figure 1. provides a visual representation of the interdisciplinary nature of research on the integration of personalized and collaborative learning approaches. The diagram depicting the distribution of studies on personalized and collaborative learning across various fields of science reveals significant trends and gaps in research focus. Social Sciences leads with 36.4% of the studies, indicating a strong emphasis on understanding educational practices and learning dynamics within this discipline. Mathematics follows with 9.1%, reflecting a notable interest in applying personalized and collaborative learning strategies in mathematical education. Engineering also shows a significant proportion at 7.3%, suggesting active research into these methods within technical education contexts. Psychology and Health Professionalism each account for 5.5%, highlighting a moderate focus on the psychological and practical aspects of personalized and

collaborative learning. In contrast, fields such as Biochemistry, Energy, and Pharmacology each contribute only 1.8% to the total studies, pointing to a relatively low engagement with these learning approaches. This distribution underscores the prominence of personalized and collaborative learning in certain fields while also indicating potential research opportunities in disciplines where these methods are less explored. Overall, the data reflects varying levels of interest and application of these educational strategies across different scientific areas, suggesting both the progress made and the potential for further research in underrepresented fields.

RESULTS AND DISCUSSIONS

In general, the essence of balanced personalized and collaborative learning is represented by the codes generated through the VOSviewer program. These codes were qualitatively analyzed to identify the main themes concerning the learning models that have been implemented and explicitly documented in the selected literature for core analysis. The results of the data analysis in this study can be seen in Figure 2 below.

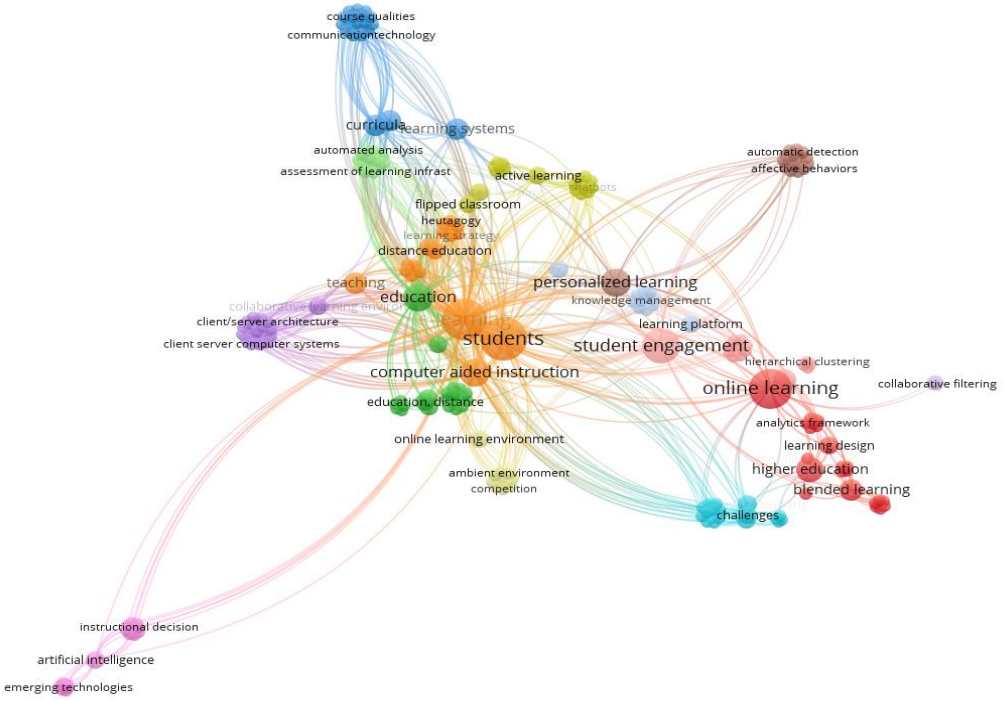

Figure 2. Analysis of Learning Models Integrating Personalized and Collaborative Approaches

Figure 2 illustrates the key themes and models identified from the literature, providing insights into how personalized and collaborative learning can be effectively balanced and integrated, as:

Collaborative Filtering:

Collaborative filtering (Papadakis et al., 2022; Zaoui Seghroucheni et al., 2015) is a method used in personalized learning to provide recommendations tailored to user preferences. This technique leverages data from various users to

identify patterns and relationships among their preferences. In collaborative filtering, the learning system observes how users interact with content (e.g., course materials, books, or movies) and attempts to understand everyone's preferences based on similarities with other users' preferences. By recognizing these patterns, the system can predict and recommend content that may be liked by other users with similar preferences or usage patterns.

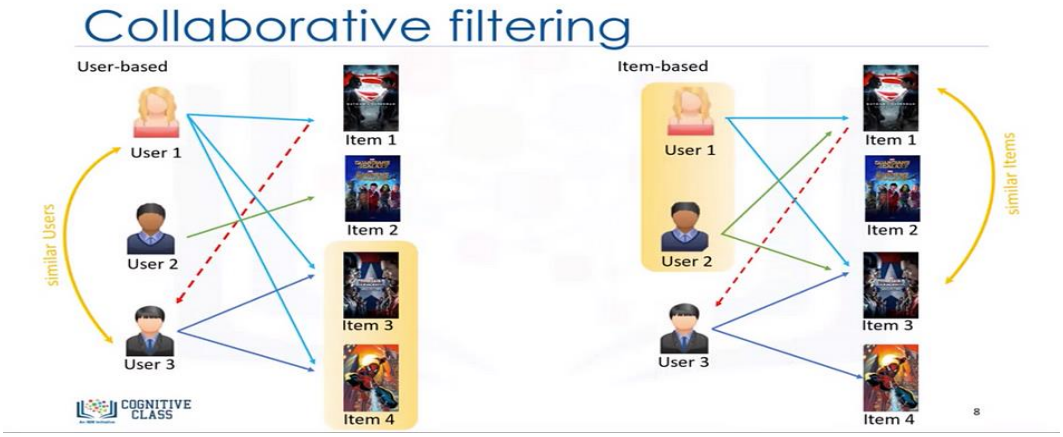

Figure 3. Illustration of Collaborative Filtering Learning
Source: Collaborative Filtering. by Mehmet Toprak | Medium

In the context of Islamic education management (Hidayah, 2021), the application of collaborative filtering involves a process that includes planning, organizing, implementing, and evaluating. First, planning (Elice & ., 2023) involves identifying the needs and interests of students to develop relevant material recommendations that align with the principles of *tarbiyah*, emphasizing the importance of student engagement in the learning process. In the organizing (Lainema et al., 2023)stage, data from students with similar learning patterns are collected and grouped to create an effective recommendation system. Next, in the implementation stage, the *collaborative filtering* system is integrated into the learning environment, providing tailored content recommendations to enhance active student participation. This process also utilizes the Theory of Learning Environment, considering physical and digital factors to create a conducive learning atmosphere. Finally, the evaluation stage is crucial for measuring the effectiveness of the system by analyzing student feedback and their learning outcomes.

Collaborative Learning with Reflection and Feedback

In the context of Islamic education management, Collaborative Learning with Reflection and Feedback aligns with the principle of *ta'awun* (mutual assistance) in the learning process. This approach allows students to learn from and support one another in achieving their learning objectives. Through interactions among students, they can deepen their understanding and enrich their knowledge by exchanging perspectives. This reinforces the role of teachers as facilitators who not only provide information but also guide students to think critically through group discussions and collaborative tasks. The principles of

Islamic education management, which emphasize cooperation, solidarity, and *ukhuwah* (brotherhood), are reflected in this learning method, where each student actively participates and supports one another to achieve a deeper understanding of the subject matter.

The process of reflection and feedback in this learning approach is essential for developing students' metacognitive skills, which aligns with Islamic teachings that encourage self-reflection (*muhasabah*). Students are encouraged to reflect on their learning achievements, recognize their strengths, and identify areas for improvement, both individually and within a team context. Through daily journals, classroom discussions, or self-evaluations, students can assess their progress and address weaknesses through constructive feedback from teachers and peers. This not only enhances the quality of learning but also fosters an inclusive and sustainable educational environment, consistent with the principles of Islamic education management.

Computer Aided Instruction

The utilization of computer technology to support learning, such as employing interactive learning software or simulations to assist students in better understanding the material (Suson & Ermac, 2020)). Computer Aided Instruction (CAI) involves the use of computer technology to support the learning process, which can encompass various forms of interactive learning software. From the perspective of Islamic education management, Computer Aided Instruction (CAI) can be seen as a tool to enhance both individual and collaborative learning while aligning with the principles of Islamic education, such as tazkiyah (self-purification) and jama'ah (community building). The use of computer technology in supporting education allows for more flexible and adaptive learning methods that cater to the unique needs of each student, in line with the Islamic principle of fostering personal growth and excellence. Through CAI, students can engage in personalized learning experiences, where educational content is tailored to meet their specific needs and abilities, facilitating their intellectual development (aql). This personalization aligns with the goal of ihsan (excellence), enabling students to grasp concepts at their own pace and revisit materials as necessary to deepen their understanding without feeling pressured.

Additionally, CAI supports collaborative learning, which mirrors the Islamic value of *ukhuwah* (brotherhood) and collective responsibility. Through the use of technology, students can engage in group projects, discussions, and shared learning experiences, fostering a sense of community and cooperation. Interactive learning platforms and tools, such as Learning Management Systems (LMS), encourage both independent and communal learning, preparing students for real-world challenges while maintaining a balance between individual achievement and the collective good. The simulations and virtual experiments available through CAI enable students to explore complex or risky scenarios in a safe environment, reflecting the principle of *amanah* (trust) in safeguarding their well-being while enhancing their learning. Thus, CAI in Islamic education management integrates personalized learning and collaborative engagement, fostering both intellectual and spiritual growth in students.

E-learning

Learning delivered electronically via the internet or computer networks, enabling flexible and personalized access to education through online learning platforms (Barber, 2015). E-learning, or electronic learning, has revolutionized the way we access and participate in education (Inayat et al., 2013). Utilizing the internet or computer networks, e-learning provides a platform that allows for learning to occur anytime and anywhere, without geographical or temporal constraints (Qureshi et al., 2023). Examples include heutagogy (Levy-Feldman, 2018; Rusli et al., 2020), flipped classrooms (Fernando et al., 2020; Nja et al., 2022), and distance learning (Akdag & Altinay, 2021).

From the perspective of Islamic education management, e-learning aligns with the principles of flexibility and personalization in education, as well as the Islamic concept of continuous learning (*thalab al-ilm*). E-learning, which utilizes internet or computer networks, allows for education to be accessed anywhere and at any time, facilitating learning that is not restricted by geography or time. This is in line with the Islamic educational principle of providing access to knowledge for all, regardless of location or circumstances. Furthermore, e-learning supports personalized learning experiences, enabling the curriculum to be tailored to the needs and abilities of each student, as advocated in Islamic education where individual growth and learning pace are respected.

Developing a Flexible Curriculum

Developing a curriculum tailored to the needs and interests of students enables them to learn in the most effective way for them (Ribeirinha & Silva, 2021). Curriculum flexibility is an innovative approach in education aimed at adapting learning to the needs and interests of each student (Greaves & Bahous, 2021). By adopting this flexibility, the curriculum becomes less rigid and unidirectional, and more adaptive and responsive to the diverse learning styles and individual preferences of students. This approach allows students to access learning materials appropriate to their level of understanding and develop skills based on their interests, ultimately enhancing learning motivation and academic outcomes.

From the perspective of Islamic education management, developing a flexible curriculum aligns with the principles of *maqasid al-shariah* (objectives of Islamic law), where education aims to nurture the holistic development of individuals while maintaining adherence to Islamic values. A flexible curriculum tailored to the needs and interests of students reflects the Islamic principle of *taysir* (facilitation), allowing students to learn in ways that are most effective and beneficial for them. This flexibility emphasizes the importance of adapting learning to individual students' needs, just as Islamic education encourages the consideration of students' fitrah (natural disposition) in the learning process. By adopting a flexible approach, the curriculum becomes more adaptive and responsive to the diverse learning styles and preferences of students, which is in line with the Islamic concept of *rahmatan lil 'alamin* (a mercy to all creations), promoting inclusivity and support for all learners.

CONCLUSION

Based on the literature review, various learning approaches—such as collaborative filtering, collaboration with reflection and feedback, e-learning, and flexible curricula—can significantly enhance educational outcomes in individual and group settings. From an Islamic education management perspective, these strategies align well with *ukhuwah* (brotherhood) and *taysir* (facilitation) principles. Collaborative filtering utilizes algorithms to analyze students' past interactions, preferences, and performance to recommend personalized learning materials. This tailored approach optimizes individual learning experiences and fosters a supportive environment where students with similar needs can collaborate effectively. By engaging with content and each other, students develop both personal and group dynamics, which are essential in Islamic educational settings.

Additionally, incorporating collaboration with reflection and feedback strengthens individual and collective learning. Students participate in structured peer interactions, providing and receiving feedback through group discussions and peer reviews. This process cultivates diverse perspectives and social skills. Reflective practices, integrated into the curriculum through regular assessments and activities such as journal entries, help students evaluate their progress and set improvement goals. Timely feedback mechanisms further enhance this experience, encouraging peer-to-peer interaction and self-assessment. This integrated approach fosters a holistic learning environment that aligns with Islamic values, promoting personal growth and collaborative skills while adapting to students' evolving needs through flexible curricula and e-learning platforms.

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REFERENCES

Akdag, S., & Altinay, Z. (2021). Learning Through Digital Stories for Safe School Environment. *Frontiers in Psychology*, *12*, 738954. https://doi.org/10.3389/fpsyg.2021.738954

Azevedo, B. F., Pacheco, M. F., Fernandes, F. P., & Pereira, A. I. (2024). Dataset of Mathematics Learning and Assessment of Higher Education Students Using the MathE Platform. *Data in Brief*, *53*, 110236. https://doi.org/10.1016/j.dib.2024.110236

Azevedo, B. F., Pereira, A. I., Fernandes, F. P., & Pacheco, M. F. (2022). Mathematics Learning and Assessment Using Mathe Platform: A Case Study. *Education and Information Technologies*, *27*(2), 1-23. https://doi.org/10.1007/s10639-021-10669-y

Bai, H. (2019). Pedagogical Practices of Mobile Learning in K-12 and Higher Education Settings. *TechTrends*, *63*(5), 611-620. https://doi.org/10.1007/s11528-019-00419-w

Barber, W. (2015). Building Community in Flipped Classrooms: A Narrative Exploration of Digital Moments in Online Learning. *Proceedings of the International Conference on E-Learning, ICEL, 2015-January*.

Blumenstein, M. (2020). Synergies of Learning Analytics and Learning Design: A Systematic Review of Student Outcomes. *Journal of Learning Analytics*, *7*(3), 13-32. https://doi.org/10.18608/JLA.2020.73.3

Carrera-Rivera, A., Ochoa, W., Larrinaga, F., & Lasa, G. (2022). How-to Conduct A Systematic Literature Review: A Quick Guide for Computer Science Research. *MethodsX*, *9,* 101895. https://doi.org/10.1016/j.mex.2022.101895

Chandrasekaran, R., Tan, A. L., Tan, S. C., & Yeong, F. M. (2019). Solving Ill-Structured Problems Mediated by Online-Discussion Forums: Mass Customisation of Learning. *ASCILITE 2019 - Conference Proceedings - 36th International Conference of Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education: Personalised Learning. Diverse Goals. One Heart*. https://doi.org/10.14742/apubs.2019.159

Christinawati, Amalia, Y. S., Mustofa, H. R. B., & Pandin, M. G. R. (2020). Social Character Through Poetry for Children in Rehabilitation. *Talent Development and Excellence*, *12*(1).

Elice, D., & . S. (2023). Philosophy of Islamic Education Management: Islamic Education Management Challenges in Facing Globalization Era. *Journal of Multidisciplinary Cases*, *33,* 28-34. https://doi.org/10.55529/jmc.33.28.34

Fernando, E., Titan, Surjandy, & Meyliana. (2020). Factors Influence the Success of E-Learning Systems for Distance Learning at the University. *Proceedings of 2020 International Conference on Information Management and Technology, ICIMTech 2020*. https://doi.org/10.1109/ICIMTech50083.2020.9211163

Fung, D. (2023). The Synergy of Peer Collaboration and Mind Mapping in Cultivating Primary Students' Science Understanding: An Integrative Pedagogy to Enhance Science Concept Acquisition. *International Journal of Science Education,* *46*(2), 131-154. https://doi.org/10.1080/09500693.2023.2222549

Greaves, M., & Bahous, R. (2021). Adapting to Change; Exploring Early Childhood Educators' Perceptions of a Child-Centered Curriculum. *Early Childhood Education Journal*, *49*(4), 581-592. https://doi.org/10.1007/s10643-020-01077-x

Grenier, M., & Yeaton, P. (2012). The Cooperative Learning Model as An Inclusive Pedagogical Practice in Physical Education. In *Cooperative Learning in Physical Education: A Research Based Approach*. https://doi.org/10.4324/9780203132982-19

Hamzah, F., Abdullah, A. H., & Ma, W. (2024). Advancing Education through Technology Integration, Innovative Pedagogies and Emerging Trends: A Systematic Literature Review. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *41*(1), 44-63. https://doi.org/10.37934/araset.41.1.4463

Hanushek, E. A., & Woessmann, L. (2020). The Economic Impacts of Learning Losses. OECD Education Working Papers, no. 225. In *OECD Publishing*.

Hasanah, E., Al Ghazy, M. I., Suyatno, S., Maryani, I., & Mohd Yusoff, M. Z. (2023). Unlocking Classroom Potential: Exploring the Mediating Role of Teacher Mindset on Embracing Differentiated Instruction. *International Journal of Learning, Teaching and Educational Research*, *22*(10), 433–452. https://doi.org/10.26803/ijlter.22.10.24

Hidayah, H. (2021). Teori Manajemen Pendidikan Islam. *Jurnal Mumtaz*, *1*(1), 44-52.

Inayat, I., Amin, R. U., Inayat, Z., & Salim, S. S. (2013). Effects of Collaborative Web Based Vocational Education and Training (VET) on Learning Outcomes. *Computers and Education*, *68*, 153-166. https://doi.org/10.1016/j.compedu.2013.04.027

Khosravi, H., Sadiq, S., & Gasevic, D. (2020). Development and Adoption of An Adaptive Learning System Reflections and Lessons Learned. *SIGCSE 2020 - Proceedings of the 51st ACM Technical Symposium on Computer Science Education*. https://doi.org/10.1145/3328778.3366900

Krouska, A., Troussas, C., & Sgouropoulou, C. (2022). Mobile Game-Based Learning as A Solution in Covid-19 Era: Modeling the Pedagogical Affordance and Student Interactions. *Education and information technologies*, *27*(1), 229-241. https://doi.org/10.1007/s10639-021-10672-3

Kumar, J. A. (2021). Educational Chatbots for Project-Based Learning: Investigating Learning Outcomes for A Team-Based Design Course. *International Journal of Educational Technology in Higher Education*, *18*(1), 65. https://doi.org/10.1186/s41239-021-00302-w

Lashley, L. (2017). The Effects of Computer-Aided Instruction in Mathematics on the Performance of Grade 4 Pupils. *SAGE Open*, *7*(3), 2158244017712775. https://doi.org/10.1177/2158244017712775

Lau, S. H., Tay, K. M., & Ng, C. K. (2014). An Application of Fuzzy Adaptive Resonance Theory to Engineering Education. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *8836*. https://doi.org/10.1007/978-3-319-12643-2_52

Levy-Feldman, I. (2018). The Good Teacher for The Twenty-First Century: A "Mentoring Teacher" with Heutagogical Skills. *International Journal of Mentoring and Coaching in Education*, *7*(2), 177-190. https://doi.org/10.1108/IJMCE-10-2017-0067

Luo, L., Yang, Y., & Wei, Y. (2017). Research on Adaptive Mobile Collaborative Learning System. In *Data Science: Third International Conference of Pioneering Computer Scientists, Engineers and Educators, ICPCSEE 2017, Changsha, China,* (pp. 414-423). https://doi.org/10.1007/978-981-10-6388-6_34

Nja, C. O., Orim, R. E., Neji, H. A., Ukwetang, J. O., Uwe, U. E., & Ideba, M. A. (2022). Students' attitude and Academic Achievement in A Flipped Classroom. *Heliyon*, *8*(1). https://doi.org/10.1016/j.heliyon.2022.e08792

Papadakis, H., Papagrigoriou, A., & Fragopoulou, P. (2022). Collaborative Filtering Recommender Systems Taxonomy. *Knowledge and Information Systems*, *64*(1). https://doi.org/10.1007/s10115-021-01628-7

Qureshi, M. A., Khaskheli, A., Qureshi, J. A., Raza, S. A., & Yousufi, S. Q. (2023). Factors Affecting Students' Learning Performance through Collaborative Learning and Engagement. *Interactive Learning Environments*, *31*(4), 2371-2391. https://doi.org/10.1080/10494820.2021.1884886

Ribeirinha, T., & Silva, B. (2021). The Coexistence Between Online and Face-to-Face Learning in The Students' Training Process: An Action-Research Study on the Operationalization of The Flipped Classroom in Portuguese Secondary Education. *Revista Portuguesa de Educacao*, *34*(2), 161-182. https://doi.org/10.21814/RPE.21345

Rogosic, S., Maskalan, A., & Jurki, A. (2020). What Are the Key Roles of Education? *Jahr*, *11*(22), 445-465. https://doi.org/10.21860/J.11.2.7

Rusli, R., Rahman, A., & Abdullah, H. (2020). Student Perception Data on Online Learning Using Heutagogy Approach in the Faculty of Mathematics and Natural Sciences of Universitas Negeri Makassar, Indonesia. *Data in Brief*, *29,* 105152. https://doi.org/10.1016/j.dib.2020.105152

Seghroucheni, Y., AL Achhab, M., & El mohajir, B. E. (2015). A Bayesian Network Based on the Differentiated Pedagogy to Generate Learning Object According to FSLSM. *International Journal of Recent Contributions from Engineering, Science & IT (IJES)*, *3*(2), 21-26. https://doi.org/10.3991/ijes.v3i2.4363

Suson, R., & Ermac, E. (2020). Computer Aided Instruction to Teach Concepts in Education. *International Journal on Emerging Technologies*, *11*(3), 47-52.

Troussas, C., Krouska, A., Alepis, E., & Virvou, M. (2020). Intelligent and Adaptive Tutoring through A Social Network for Higher Education. *New Review of Hypermedia and Multimedia*, *26*(3–4). https://doi.org/10.1080/13614568.2021.1908436

Yang, G., Dai, Y., Zhao, H., Hirota, K., & Lu, H. (2017). Intelligent Web-based Experiment Management System Using Multi-Agent Concept. *Proceedings IECON 2017 - 43rd Annual Conference of the IEEE Industrial Electronics Society*, *2017-January*. https://doi.org/10.1109/IECON.2017.8217494

Yanjin, S., Liu, Q., Kun, Z., & Ruirui, Z. (2023). The Application of Artificial Intelligence Technology in Personalized Teaching of Vocational Education. *2023 13th International Conference on Information Technology in Medicine and Education (ITME)*, 846–850. https://doi.org/10.1109/ITME60234.2023.00172

Zhang, J. H., Zhang, Y. X., Zou, Q., & Huang, S. (2018). What Learning Analytics Tells Us: Group Behavior Analysis and Individual Learning Diagnosis Based on Long-Term and Large-Scale Data. *Educational Technology and Society*, *21*(2), 245-258.

Zhang, Z., Cao, T., Shu, J., Zhi, M., Liu, H., & Li, Z. (2017). Exploration of Blended Teaching Pattern Based on Hstar and Smart Classroom. *Proceedings - 2017 International Symposium on Educational Technology, ISET 2017*. https://doi.org/10.1109/ISET.2017.10

Zhao, J., Zhuang, F., Ao, X., He, Q., & Ma, L. (2021). Survey of Collaborative Filtering Recommender Systems. *Journal of Cyber Security*, *6*(05), 17-34. https://doi.org/10.19363/J.cnki.cn10-1380/tn.2021.09.02