PETiER
Psychology, Evaluation, and Technology
in Educational Research

Integrating generative pre-trained transformer into a differentiated learning management system for counselor education

Arbin Janu Setiyowati [a] *, Riskiyana Prihatiningsih [b], Khairul Bariyyah [c], Hengki Tri Hidayatullah [d]

Universitas Negeri Malang, Semarang St. No. 5, Malang, East Java, 65145, Indonesia
[a] arbin.janu.fip@um.ac.id; [b] riskiyana.prihatiningsih.fip@um.ac.id; [c] khairul.bariyyah.fip@um.ac.id;
[d] hengki.tri.2401118@students.um.ac.id
*Corresponding Author

Abstract: Differentiated learning has become a critical approach in counselor education, as it allows instructional processes to be tailored to individual learner needs. However, most existing Learning Management Systems (LMS) have yet to fully support this pedagogical principle. With the rapid advancement of artificial intelligence, particularly Generative Pre-trained Transformer (GPT) models, new opportunities have emerged to develop more adaptive and personalized LMS platforms. This study aims to identify the initial design needs of a differentiated learning LMS in counselor education and explore the potential integration of GPT as a supportive technology. Employing an exploratory qualitative approach, data were collected from 34 pre-service teachers in a Guidance and Counseling Teacher Professional Education Program using a combination of open- and closed-ended questionnaires and semi-structured interviews. The analysis revealed eight key areas of student need within the LMS, including media variation, contextualization, interactivity, accessibility, and automated feedback. GPT's features were found to align with these needs, particularly its ability to deliver case-based simulations, personalized content recommendations, and adaptive feedback. These findings provide a conceptual foundation for the development of LMS platforms that are more contextualized, human-centered, and capable of supporting differentiated learning in counselor education.

Keywords: Differentiated Learning; Learning Management System; Counselor Education; GPT; Artificial Intelligence

INTRODUCTION

The advancement of digital technology in 21st-century education has driven numerous innovations in learning systems, one of which is the widespread adoption of Learning Management Systems (LMS) as a primary medium in higher education. An LMS serves not only as a platform for organizing instructional materials but also as an interactive environment that supports technology-based learning (Alam et al., 2021; Duta et al., 2021). In recent years, LMS platforms have also been utilized in counselor education programs, where effective integration has become increasingly crucial for facilitating flexible and in-depth learning experiences, given the complexity of competencies that must be developed, both theoretically and in practice.

Previous studies have highlighted that LMS platforms can enhance students' professional competencies in counselor education through features that support collaborative, reflective, and case-based learning (Trowler, 2022; Ismail et al., 2021).

Despite the growing role of LMS in higher education, most existing systems still adopt a uniform instructional design and have yet to fully accommodate the principles of differentiated learning. Differentiated learning is a pedagogical strategy designed to tailor content, processes, and learning outcomes according to students' needs, learning styles, and readiness levels (Ardenlid et al., 2025; Sun, 2023). This approach is particularly important in counselor education, where prospective counselors are expected to develop the ability to design individualized services that are equitable and responsive to the diverse characteristics and needs of their future clients. Beyond its application in professional practice, differentiated instruction is also highly relevant to counselor education itself, which is characterized by personal uniqueness, varied experiences, and diverse levels of initial competence among students. Unfortunately, limited research has been conducted on how LMS platforms can be designed to truly support differentiated instruction in the context of counselor education (Gheyssens et al., 2022)

The main problem addressed in this study is the absence of an LMS design framework specifically aimed at supporting differentiated learning in counselor education. While the need for adaptive learning approaches has been widely acknowledged, existing LMS platforms have not yet sufficiently met the demands of personalized instruction. This situation reveals a gap between the potential of educational technology and the pedagogical approaches necessary for preparing professional counselors.

One promising solution that has emerged is the utilization of artificial intelligence (AI), particularly Generative Pre-trained Transformer (GPT) models. GPT has demonstrated significant potential in facilitating interactive and personalized learning experiences through natural language processing that can tailor responses to user context (Maurya, 2024). In educational settings, GPT is increasingly being used to answer students' questions, provide automated feedback, and even assist instructors in designing adaptive content (Maree et al., 2024; Panjabi et al., 2024). The integration of GPT into LMS platforms opens new possibilities for developing learning systems that are more flexible, dialogic, and responsive to students' individual learning needs.

Several studies have shown that GPT can identify students' learning needs based on verbal or written inputs, recommend learning activities or resources aligned with individual profiles, and offer emotional and motivational support throughout the learning process (Shete et al., 2024; Shoaib et al., 2024). Furthermore, GPT can function as a virtual agent that supports students personally in understanding complex concepts or reflecting on their learning experiences. This function is especially relevant in counselor education, where building reflective and interpersonal competencies is central to professional development.

However, existing research has largely focused on GPT integration in general educational domains such as literacy, STEM, or writing skills development. There is still a lack of research explicitly examining how GPT can be leveraged in the design of LMS platforms that support differentiated instruction specifically within counselor education. In addition, no comprehensive conceptual model or design framework currently exists to guide the integration of GPT in this context.

Therefore, the present study aims to explore the initial design needs of an LMS that supports differentiated learning in counselor education, while also examining the potential integration of GPT as a supportive technology. This study serves as a preliminary investigation intended to identify design needs from the perspective of end-users (counselor education lecturers and

students), and to explore the potential affordances of GPT in addressing these needs. The novelty of this study lies in its exploratory integration of differentiated pedagogical approaches with generative AI technology an area that has received limited attention in the context of LMS design for professional education. As such, the findings of this research are expected to provide a conceptual foundation for the development of more adaptive, contextualized, and innovative LMS systems that better support the learning of future counselors.

METHODS

Research Design

This study employed a descriptive qualitative exploratory design aimed at identifying students' needs in Learning Management System (LMS)-based instruction and exploring the potential integration of Generative Pre-trained Transformer (GPT) technology into the design of differentiated learning. This approach was selected to obtain an in-depth understanding of students' perceptions, experiences, and expectations regarding LMS features that support personalized learning within counselor education programs.

Participants

The participants in this study consisted of 34 students enrolled in the Teacher Professional Education Program in the field of Guidance and Counseling at one of Indonesia's teacher training institutions (Table 1 and Table 2). All participants had completed coursework in differentiated Instruction, providing them with sufficient pedagogical foundations to offer informed feedback on the design requirements for an LMS that supports differentiated learning.

Table 1. Summary distribution of respondents by gender

Gender	Number of Respondents	Percentage (%)
Female	27	79.4%
Male	7	20.6%
Total	34	100%

Participants were selected using a purposive sampling technique, based on two primary criteria: (1) participants were currently using or had prior experience with LMS platforms in online learning contexts, and (2) they had explicit exposure to the principles of differentiated instruction. These criteria ensured the relevance of the data to the research focus namely, the exploration of design needs for adaptive and context-sensitive learning systems in counselor education.

Table 2. Summary distribution by educational field

Educational Background	Number of Respondents	Percentage (%)
Bachelor of Education	25	73.5%
Master of Education	3*	8.8%
Bachelor of Social Science	3	8.8%
Bachelor of Computer Science	2	5.9%
Bachelor of Economics	1	2.9%
Bachelor of Mathematics	1	2.9%
Total	34	100%

Note: *One respondent holds both bachelor and master and is counted in the master total

Data Collection

Data collection was carried out using two primary techniques: Open and closed-ended questionnaires, which were designed to explore students' perceptions regarding various aspects of LMS-based learning needs, including media availability, interactivity, accessibility, contextual relevance, and automated feedback. The questionnaires were distributed online through a digital survey platform. Semi-structured interviews, conducted with 10 representative students, aimed at further investigating the quantitative findings and providing narrative context to students' preferences and challenges in using the LMS.

Data Analysis

Data obtained from the closed-ended questionnaires were analyzed using descriptive quantitative methods to determine the frequency distributions and percentage representations of students' learning needs. Meanwhile, data derived from open-ended questionnaire responses and semi-structured interviews were analyzed using a thematic analysis approach, allowing for the identification of key patterns and themes emerging from the qualitative data

RESULTS AND DISCUSSION

Initial Needs Assessment

The needs analysis conducted on 34 student respondents enrolled in a counselor education program revealed several critical aspects regarding the use of learning media within the current Learning Management System (LMS), which warrant further attention in future system development. Table 1 summarizes eight categories of needs identified based on students' responses.

A total of 85% of students reported that the available learning media lacked variety, being largely limited to textual modules and static slide presentations. This indicates a strong demand for more contextualized content (78%), including the integration of simulations and case studies relevant to real-world school-based learning. Additionally, interactivity emerged as a key concern (72%), with students expressing the need for more engaging formats such as animated videos, digital quizzes, and other forms of online interaction.

From a technical standpoint, both accessibility (68%) and ease of use (65%) were highlighted, particularly in relation to difficulties in accessing materials across different devices and navigating LMS interfaces that were perceived as unintuitive. Students also emphasized the importance of integrated multimedia support (76%) and more concise and effective content delivery (70%), noting that lengthy materials often hinder comprehension of core concepts.

The identified need for relevance to real-world professional practice (82%), along with requests for automated evaluation features and immediate feedback (60%), underscores the role of the LMS not merely as a content delivery platform but as a pedagogical simulator that bridges the learning experience with students' future professional contexts.

These findings provide a critical foundation for the design of a differentiated learning LMS and further reinforce the justification for integrating artificial intelligence technologies such as Generative Pre-trained Transformer (GPT). GPT features, including scenario-based simulations, automated feedback, and personalized learning content demonstrate strong potential to directly address many of the student-identified needs highlighted in this study.

Table 3. Initial needs assessment

Need Aspect	Findings from the Analysis	Number of Respondents (%)
Availability of Learning Media	Students feel that the media available on the LMS lack variety, consisting only of reading modules, PPTs, and other text-based materials.	85%
Contextualization of Content	Students need media that present real examples or simulations of teaching cases in schools.	78%
Media Interactivity	Students want interactive learning media, such as animated videos, simulations, or digital quizzes.	72%
Media Accessibility	Students complain that the media are not easily accessible on various devices and require a more flexible format.	68%
Multimedia Support	Students expect a combination of visual, audio, and interactive media to facilitate understanding.	76%
Content Duration and Presentation	Current media content is considered too long and ineffective in explaining core concepts.	70%
Relevance to Real Teaching Practice	Students need media that are directly relevant to teaching practices in the field, such as case studies.	82%
Ease of Use	Students expect intuitive media that do not require additional training to use.	65%
Feedback and Evaluation	Students need automatic evaluation features and immediate feedback within the learning media.	60%

To further understand the alignment between students' expressed needs and the pedagogical potential of artificial intelligence, this study mapped the findings from the needs analysis against the specific functionalities offered by Generative Pre-trained Transformer (GPT). The analysis aimed to identify how GPT could address the limitations and challenges currently observed in conventional Learning Management Systems (LMS), particularly those used in counselor education programs. By examining both qualitative and quantitative feedback from students, a pattern emerged that suggested a clear gap between the current state of LMS-based instruction and the desired characteristics of a differentiated, learner-centered digital learning environment.

The table below presents a structured comparison between key aspects of student-identified needs and the potential features that GPT can offer when integrated into a differentiated learning LMS. This mapping not only highlights areas of technological intervention but also frames GPT as a strategic pedagogical tool capable of enriching personalization, contextual relevance, and interactive learning dimensions that are highly valued in professional counselor training.

Table 4. Mapping student needs and GPT potential features in a differentiated learning LMS

Student Learning Needs	Key Findings	Potential GPT Features
Availability and Diversity of Media	Learning content is limited to text/PPT; 85% of students are dissatisfied	GPT can generate diverse content formats: adaptive summaries, rephrasings, and case studies
Contextualization of Learning Materials	78% of students request real-life scenario simulations	GPT is capable of generating context-based counseling scenarios in real time

Interactivity of Media	72% of students desire interactive content (e.g., videos, quizzes, simulations)	GPT supports interactive dialogues through dynamic natural language exchanges
Accessibility and Ease of Use	LMS is hard to access on multiple devices (68%); interface is not intuitive	GPT can be embedded in lightweight, text-based, multiplatform chatbot interfaces
Automated Feedback and Evaluation	Only 60% perceive this feature as present in the current LMS	GPT can provide real-time, automated feedback on written reflections and assignments
Relevance to Real-World Practice	82% of students want content directly applicable to classroom teaching scenarios	GPT can simulate real student interactions and context-appropriate teaching situations

Integration of Generative Pre-Trained Transformer in a Differentiation LMS for Counselor Education

Figure 1 presents a conceptual framework illustrating how Generative Pre-trained Transformer (GPT) technology can be integrated into a Learning Management System (LMS) designed to support differentiated learning in counselor education. The model is structured around three primary components: input, process, and outcome, each representing a critical stage in building a learning system that is not only adaptive but also responsive to the diverse learning needs of students.

In the input stage, the model begins with the identification of individual needs among counselor trainees. At this point, the relevance of differentiated instruction becomes evident, as students in counselor education programs often enter with varied backgrounds, levels of preparedness, and learning styles. Based on these needs, the framework branches into two pathways: content differentiation and process integration. Content differentiation focuses on aligning instructional goals and strategies with students' individual learning profiles. Meanwhile, process integration positions GPT as an essential component of the learning system, capable of delivering contextually relevant and adaptive learning experiences.

During the process stage, GPT functions not merely as a technical tool but as a learning partner offering several core capabilities. These include providing automated, context-sensitive feedback, recommending personalized learning resources, and generating scenario-based simulations that closely mirror real-world counseling practice. Collectively, these features position GPT not only as a supportive technology but also as a means to enrich the differentiated learning framework, enabling students to engage in learning that is tailored to their individual needs while maintaining academic structure and rigor.

At the outcome stage, the integration of GPT within the differentiated learning model results in two key impacts: increased student engagement and the emergence of truly personalized learning experiences. These outcomes serve as critical pillars in developing the competence of future counselors, not only in terms of theoretical understanding, but also in the practical application of counseling skills in authentic settings.

Overall, this model offers a preliminary proposition for rethinking the role of artificial intelligence technologies such as GPT, not as replacements for educators, but as tools that amplify the reach of inclusive, adaptive, and student-centered education. In the context of counselor education, this approach provides a conceptual foundation for developing LMS platforms that are not only pedagogically sound but also deeply humanizing, systems that do not merely manage learning, but actively support the formation of professional competence through personalized, meaningful learning experiences.
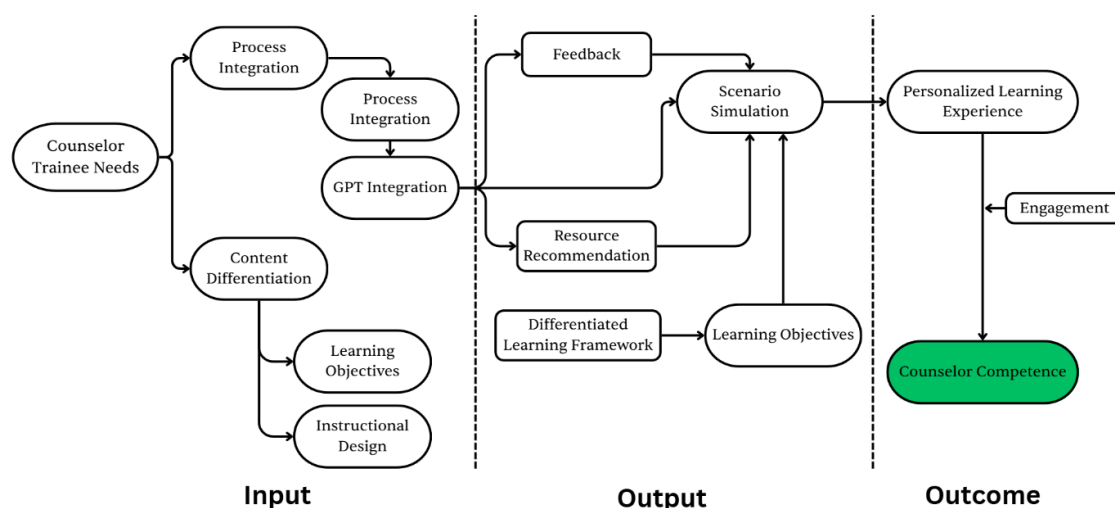
Figure 1. Integration of GPT in a differentiation learning for counselor education

The findings of this study highlight the need to reimagine LMS design in counselor education to better align with the principles of differentiated instruction. Most students reported that current LMS platforms lack variety, interactivity, and relevance to practical contexts. Their expectations go beyond content access, they seek meaningful, personalized learning experiences that respond to their individual needs and professional preparation (Muthukrishnan et al., 2024; Neo et al., 2008; Oguguo et al., 2021).

This gap between existing LMS features and student expectations points to the urgent need for a more adaptive and learner-centered approach. In this regard, GPT technology presents a promising solution. Its ability to generate automated feedback, suggest tailored resources, and simulate case-based learning offers new possibilities for supporting differentiated learning in a more contextualized and dynamic manner (Allen & Kendeou, 2024; Kohnke et al., 2025).

Nevertheless, the integration of GPT should be approached thoughtfully. Rather than replacing the role of educators, GPT should serve as a complement that enhances reflective, interactive, and professional learning experiences (Hidayatullah & Muslihati, 2025). Its integration into LMS platforms should aim to support not substitute the human-centered processes essential in counselor education.

CONCLUSION

This study explored the design needs for a differentiated learning LMS in counselor education and examined the potential role of Generative Pre-trained Transformer (GPT) as a supportive technology. The findings revealed that students expect more than just content delivery; they require interactive, personalized, and contextually relevant learning experiences that align with both their academic and professional development needs. Key gaps were identified between the current functionality of LMS platforms and the pedagogical demands of differentiated instruction. In response, GPT emerges as a promising tool capable of addressing these gaps through its ability to generate automated feedback, provide tailored content recommendations and simulate real-world learning scenarios. The study concludes that integrating GPT into LMS design holds strong potential to enhance personalization, engagement, and professional competence in counselor training. However, such integration must be guided by pedagogical intentions, not technological novelty. GPT should function as a partner in learning not a replacement for human educators particularly in fields that require deep interpersonal engagement, such as counseling. These insights offer a conceptual

foundation for the future development of adaptive, inclusive, and human-centered learning systems in counselor education, and set the stage for more advanced research and system design in this emerging field.

ACKNOWLEDGMENT

REFERENCES

Alam, M. N. H., Othman, R., & Mohd Yunos, S. N. M. (2021). Assessment on learning management systems for open and distance learning of engineering courses. *ASEAN Journal of Engineering Education, 5*(1), 44–50. https://doi.org/10.11113/ajee2021.5n1.61

Allen, L. K., & Kendeou, P. (2024). ED-AI lit: An interdisciplinary framework for AI literacy in education. *Policy Insights from the Behavioral and Brain Sciences, 11*(1), 3–10. https://doi.org/10.1177/23727322231220339

Ardenlid, F., Lundqvist, J., & Sund, L. (2025). A scoping review and thematic analysis of differentiated instruction practices: How teachers foster inclusive classrooms for all students, including gifted students. *International Journal of Educational Research Open, 8*, 100439. https://doi.org/10.1016/j.ijedro.2025.100439

Duta, I. P. G. P., Rio, Febriansyah, M. R., & Anggreainy, M. S. (2021). Effectiveness of LMS in online learning by analyzing its usability and features. In *Proceedings of the 2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI)* (pp. 56–61). IEEE. https://doi.org/10.1109/ICCSAI53272.2021.9609757

Gheyssens, E., Coubergs, C., Griful-Freixenet, J., Engels, N., & Struyven, K. (2022). Differentiated instruction: The diversity of teachers' philosophy and praxis to adapt teaching to students' interests, readiness, and learning profiles. *International Journal of Inclusive Education, 26*(14), 1383–1400. https://doi.org/10.1080/13603116.2020.1812739

Hidayatullah, H. T., & Muslihati. (2025). AI literacy as a catalyst for future school counselors: Enhancing guidance and counseling services. *Journal Consulenza: Jurnal Bimbingan Konseling dan Psikologi, 8*(1), 55–65. Retrieved from http://ejurnal.uij.ac.id/index.php/CONS

Kohnke, L., Zou, D., Ou, A. W., & Gu, M. M. (2025). Preparing future educators for AI-enhanced classrooms: Insights into AI literacy and integration. *Computers and Education: Artificial Intelligence, 8*, 100398. https://doi.org/10.1016/j.caeai.2025.100398

Maree, M., Azmat, F., & Jameel, A. (2024). Role of AI in higher education: Opportunities and challenges of using AI technologies. In J. D. Zufferey, G. Langie, R. Tormey, & B. V. Nagy (Eds.), *SEFI 2024 – 52nd Annual Conference of the European Society for Engineering Education: Educating responsible engineers* (pp. 1840–1853). Brussels, Belgium: European Society for Engineering Education (SEFI). https://doi.org/10.5281/zenodo.14256897

Maurya, R. K. (2024). Using AI-based chatbot ChatGPT for practicing counseling skills through role-play. *Journal of Creativity in Mental Health, 19*(4), 513–528. https://doi.org/10.1080/15401383.2023.2297857

Muthukrishnan, P., Koo, A. C., Kunalan, R., Aravind, B. R., Kumar, R. S., & Vadivel, B. (2024).

Prospective teachers' AI literacy and responsible use of AI in assignment writing. *Pakistan Journal of Life and Social Sciences, 22*(2), 7245–7263. https://doi.org/10.57239/PJLSS-2024-22.2.00547

Neo, M., Neo, T.-K., & Yap, W.-L. (2008). Students' perceptions of interactive multimedia mediated web-based learning: A Malaysian perspective. In *Proceedings of the ASCILITE 2008 Conference* (pp. 658–666). Retrieved from https://www.scopus.com

Oguguo, B. C. E., Nannim, F. A., Agah, J. J., Ugwuanyi, C. S., Ene, C. U., & Nzeadibe, A. C. (2021). Effect of learning management system on students' performance in educational measurement and evaluation. *Education and Information Technologies, 26*(2), 1471–1483. https://doi.org/10.1007/s10639-020-10318-w

Panjabi, R., Al-Sa'di, A., & Ahmad, E. (2024). Advantage of using AI in education to enhance learning: Review and analysis. In *Proceedings of the 2024 2nd DMIHER International Conference on Artificial Intelligence in Healthcare, Education and Industry (IDICAIEI)*. IEEE. https://doi.org/10.1109/IDICAIEI61867.2024.10842853

Shete, S. G., Koshti, P., & Pujari, V. I. (2024). The impact of AI-powered personalization on academic performance in students. In G. C. Mahato, S. S., & S. Dash (Eds.), *Proceedings of the 5th International Conference on Recent Trends in Computer Science and Technology (ICRTCST 2024)* (pp. 295–301). IEEE. https://doi.org/10.1109/ICRTCST61793.2024.10578480

Shoaib, M., Sayed, N., Singh, J., Shafi, J., Khan, S., & Ali, F. (2024). AI student success predictor: Enhancing personalized learning in campus management systems. *Computers in Human Behavior, 158*, 108301. https://doi.org/10.1016/j.chb.2024.108301

Sun, X. (2023). Differentiated instruction in L2 teaching: Two extensive reading programmes conducted during the COVID-19 pandemic. *Innovation in Language Learning and Teaching, 17*(2), 177–190. https://doi.org/10.1080/17501229.2021.1979985