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The Role of Artificial Intelligence-Based Recommendation Systems in Selection of Courses for Students

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ABSTRACT

Background. Modern higher education institutions are faced with complex challenges in developing curricula that suit students' needs and interests. To overcome this challenge, artificial intelligence-based recommendation systems are an attractive alternative. This system can help students in selecting courses, providing suggestions that suit their interests and needs.

Purpose. This research aims to understand students' experiences and views on recommendation systems in selecting courses in higher education, with a focus on system effectiveness, level of student trust, and ease of use. The main objective is to identify the impact of recommendation systems on students' academic decisions.

Method. The research used a quantitative survey method of 20 students at universities by collecting data through online questionnaires. The results of the analysis show that the majority of respondents are experienced with the recommendation system, rely on it in selecting courses, and tend to follow the recommendations, as well as showing user satisfaction and the influence of the system on academic decisions.

Results. The results of the study show that artificial intelligence-based recommendation systems play an important role in guiding students in their academic decision-making. However, there is a need for a deeper understanding of the factors that influence user satisfaction and system effectiveness. The interim conclusion emphasizes the need for further development and adjustment of the course recommendation system in order to increase its responsiveness to student needs.

Conclusion. This conclusion is the basis for deeper reflection and the development of a course recommendation system that can more effectively meet student expectations and needs in the ever-developing era of higher education. In this way, this research has the potential to make a significant contribution to the development of more adaptive and responsive academic decision support systems.

KEYWORDS

Artificial Intelligence, Higher Education, Recommendation System

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INTRODUCTION

In the digital era involving artificial intelligence (AI), the role of this technology is increasingly deepening in various aspects of life, including in the domain of higher education (Abbasi dkk., 2022; Jiang dkk., 2023). One area that is in the spotlight is the student course selection

process in higher education, where the presence of artificial intelligence-based recommendation systems is changing the traditional dynamics (Abdulkareem & Petersen, 2021). This background forms a discussion framework similar to an inverted pyramid, describing the development of AI technology, the situation of students in the digital era, and the impact of recommendation systems on course selection (Al Hinai dkk., 2021; Dhilleswararao dkk., 2022).

The digital era has brought dramatic changes in higher education, giving rise to new challenges along with the opportunities it presents growing rapidly (Ali dkk., 2020; Ratten, 2020). Modern students are faced with the demand to make intelligent decisions in selecting courses to achieve their academic and career goals. In the midst of the complexity of these choices, AI presents innovative solutions through a recommendation system that can direct students towards choosing courses that suit their interests, needs and goals (Almaiah dkk., 2022). However, behind this positive potential, a number of problems emerge that need to be overcome. Students are often faced with large piles of information that are confusing and difficult to elaborate. This challenge is compounded by the lack of specific guidance and personalization in decision making. How AI can provide a solution to this problem is the focus of discussion, considering the complexity of the course selection process and the variation in preferences among students (Ammar dkk., 2020).

The importance of choosing the right courses for students emphasizes that this problem is not just an individual dilemma, but also has deeper implications (Bond, 2020). Extensively on their academic progress and career development. Uncertainty in selecting courses can have negative impacts, including lengthening the study period and difficulties in achieving desired career goals (Bruijnes dkk., 2023). Therefore, research and development of solutions through AI-based recommendation systems is crucial in overcoming this problem. Previous studies have provided a basis for understanding the concept of AI-based recommendation systems in the context of student course selection (Dwivedi dkk., 2022). However, the growth of technology and changes in student preferences and needs indicate the need for continued research. This research has the main objective of exploring the extent to which AI-based recommendation systems can guide students in making smarter and more focused academic decisions (Yang dkk., 2019).

As before, this study explores the benefits and challenges faced by e-learning site users in selecting learning materials and courses. Although online learning platforms offer various benefits, such as improving academic skills, users often face complexity in selecting materials that suit their needs and preferences. The main focus of the research was on the provision of quality resources during the training phase, highlighting the lack of online help which is often the main cause of difficulties. In response to these challenges, research proposes a system architecture that leverages semantic recommendations with the help of virtual agents, tailored to user needs and preferences (Gillespie dkk., 2022).

Experimental and statistical results show that this virtual agent-based recommendation system not only improves users' learning skills, but also makes course selection easier, according to their interests and preferences, when compared with existing techniques. the latest advances in the Industrial Revolution 4.0 on the work environment, which triggered a paradigm shift in the career education system, including the introduction of a free semester system and a high school credit system. Although it aims to provide students with encouragement for independent career exploration, educational limitations for teachers and students arise due to the rapid change in educational information. This research formulates three key requirements for educational technology that addresses these challenges and proposes a data system and data-driven artificial

intelligence recommendation model to integrate career exploration topics, courses, and majors. Experimental results show that this model is successful in recommending career education content and can be well applied in the educational field (Ikhlas dkk., 2023).

Two previous studies highlight innovative solutions to educational challenges in the Industrial Revolution 4.0 era, especially in course selection and career education. The first research describes the role of virtual agents and semantic recommendations in online course selection, while the second research creates an artificial intelligence-based solution to improve limitations in career education systems. Both studies provide a positive basis for further exploration (Moorhouse & Wong, 2022). Future research on the role of Artificial Intelligence in student course selection in higher education is expected to deepen our understanding and provide further contributions to the development of intelligent solutions to support student decision making in the academic environment.

The research method that will be used is a survey method, involving the participation of 20 students as respondents. The aim of choosing this method is to gain comprehensive insight into students' experiences and perceptions of the recommendation system in selecting courses. The research statement will dig deeper into the effectiveness of the recommendation system, the level of student confidence, and the level of difficulty or ease of use of the system.

Thus, this research is expected to make a real contribution to the development of educational technology, pave the way for improving AI-based recommendation systems, and provides valuable guidance for students and higher education institutions in facing the challenges of selecting courses in this digital era.

RESEARCH METHODOLOGY

The research design used in this research is a quantitative approach with survey methods (Luo dkk., 2021). This approach was chosen to enable the collection of data that can be measured numerically, thereby facilitating more accurate statistical analysis. The research procedure began by compiling a research questionnaire designed to collect information about students' experiences, preferences and perceptions of artificial intelligence-based recommendation systems in selecting courses at universities (Mahmood dkk., 2019).

The research subjects involved 20 students at universities. The purpose of selecting a relatively small number of respondents was to ensure the quality of the data collected and facilitate analysis in the context of this research. The data collection technique was carried out by sending a questionnaire form link to 20 respondents, giving them the convenience of filling in and returning their responses online.

The research questionnaire was designed with questions that focused on students' experiences in using the recommendation system, their level of satisfaction with the recommendations provided. given, how often they rely on this system, and the extent to which this system influences their decisions in course selection. After the data was collected, data analysis was carried out using the Miles Huberman technique. This approach involves both qualitative and quantitative analysis steps, allowing researchers to gain a deeper understanding of the data and identify patterns that may emerge (Phuong Nguyen dkk., 2022).

The results of the analysis will be used to comprehensively describe student experiences and perceptions regarding intelligence-based course recommendation systems artificial. In addition, this

data analysis technique will also allow research to identify potential weaknesses and strengths of the system, provide an in-depth understanding of the factors that influence student satisfaction, and provide a basis for suggestions for improvement or development of the recommendation system in the future (Gusev & Bondarko, 2020). Thus, this research methodology is designed to provide comprehensive data and understand students' perspectives on the role of artificial intelligence-based recommendation systems in selecting courses in higher education.

RESULT AND DISCUSSION

After distributing the questionnaire to 20 student respondents, the first question was: Do you have previous experience in using a course recommendation system? With two answer options (yes and no) the following results were obtained:

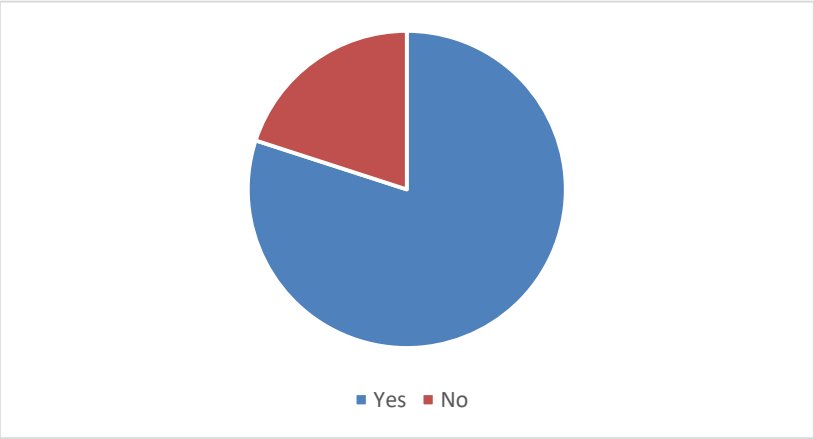

Figure 1. Respondents' results on experience in using the course recommendation system

Based on the results of a questionnaire conducted on 20 respondents, it was found that 16 respondents or 80% of the total respondents had previous experience in using a course recommendation system. These results indicate that the majority of respondents have engaged with the system, creating a basis for evaluating its impact in the context of course selection. Meanwhile, 4 respondents (20%) stated that they had no previous experience with the recommendation system.
When looking at the frequency of use, it seems that respondents who have experience using the course recommendation system tend to use it regularly. From this, we can conclude that the recommendation system has become an integral part of the course selection process for the majority of respondents involved in this research.

The importance of this system is also reflected in the fact that the majority of respondents who have experience prefer to follow system recommendations in selection their courses. This indicates that the recommendation system has a significant impact in shaping students' academic decisions, guiding them in their educational journey.

Temporary conclusions show that the course recommendation system plays an important role in supporting students in making their academic decisions (Pradana dkk., 2023). However, to gain a deeper understanding of the effectiveness and user satisfaction regarding the recommendations provided, further research needs to be carried out by analyzing certain factors that influence students' perceptions and responses to the system (Ren dkk., 2024). These conclusions provide a basis for further reflection and development of the potential of course recommendation systems to improve students' academic experience.

User Experience with the Course Recommendation System

Next question: How often do you use the course recommendation system in one semester? With answer options: Rarely, Sometimes, Often and Always. The survey results obtained from respondents were as follows:

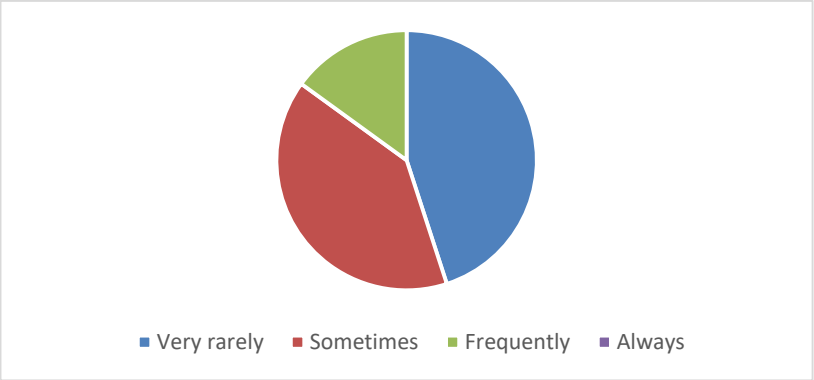

Figure 2. Results of respondents using the course recommendation system in one semester

From the survey results regarding user experiences with the course recommendation system, it was found that 9 respondents or 45% stated that they used the system 'sometimes' in one semester. Meanwhile, 8 respondents or 40% were more active in using the system, stating that they did so 'often'. The remaining three respondents, or 15%, even stated that they 'always' used the course recommendation system in one semester.

This data provides an overview of the extent to which students are involved with the course recommendation system during a certain time period. The findings show that the majority of respondents tend to use this system regularly, either with high frequency ('often' and 'always') or with lower frequency ('sometimes').

This indicates that the course recommendation system is not only a tool that is occasionally used by students, but has become a significant resource in supporting them in selecting courses. Thus, this high level of participation indicates that students tend to trust and rely on the recommendation system as a guide in navigating the diversity of courses available. Further understanding of the factors that drive different frequency of use can provide deeper insight into the effectiveness of these systems in meeting user needs (Qin dkk., 2022).

Next question To what extent are you satisfied with the recommendations provided by the system? With the answer options Very Satisfied, Satisfied, Neutral, Dissatisfied and Very Dissatisfied, the following results were obtained:

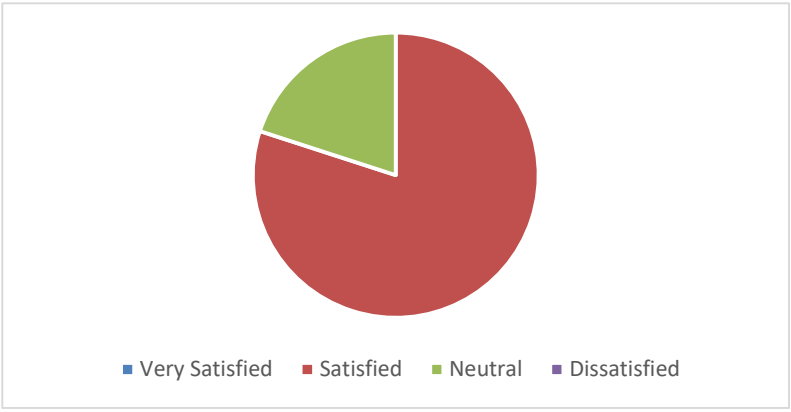

Figure 3. The results of respondents' satisfaction with the recommendations provided by the system

The survey results showed that the majority of respondents, namely 14 people or 70%, stated that they felt 'satisfied' with the recommendations given by system. Meanwhile, 6 people or 30% were in the 'neutral' category regarding their satisfaction with system recommendations. It is important to highlight that the majority of respondents expressed satisfaction with the recommendations. This shows that, in general, the course recommendation system is considered effective by the majority of students who participated in the survey.

However, it should be noted that there are some respondents who are in the 'neutral' category. To better understand the reasons behind this dissatisfaction or uncertainty, further research may be needed by exploring qualitative responses and feedback from those in these categories. Overall, these results provide a positive picture of the level of student satisfaction with the recommendation system, and can serve as a basis for understanding how the system can be further improved to meet user expectations and needs (Mehrabi dkk., 2022).

Course Selection Decisions

The next questionnaire is related to course selection decisions with the first question: Do you tend to follow system recommendations in course selection? With the answer options Yes always, Yes sometimes, No I prefer my own choice, No I do not rely on system recommendations. With the results of the respondents as follows:

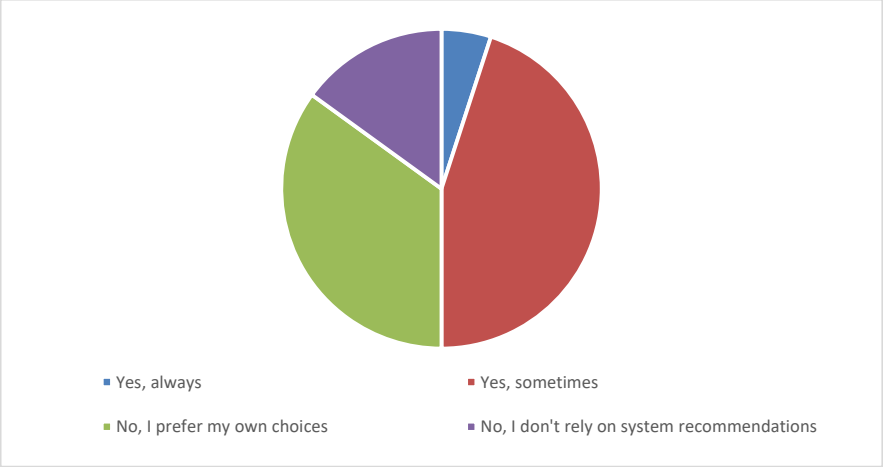

Figure 4. Results of respondents' tendency to follow system recommendations in course selection

From the results of the questionnaire regarding course selection decisions, it can be seen that the majority of respondents, namely 9 people or around 45%, stated that they 'always' follow the system recommendations in selecting courses. Meanwhile, 7 people or 35% stated that they 'yes sometimes' follow these recommendations. A total of 3 people or 15% stated that they preferred not to follow the system recommendations and preferred their own choices. Meanwhile, only 1 person or 5% stated that they did not rely on system recommendations at all in making course selection decisions.

These results reflect that although the majority of respondents tend to follow system recommendations, there is a small number of students who prefer to make their own decisions without being too depending on these recommendations. Further understanding of the reasons behind this decision can provide deeper insight into the factors that influence students' course selection decisions (Owoc dkk., 2021).

The next question regarding course selection decisions is How important is the recommendation system in your course selection decision-making process? With the answer options being Very Important, Important, Neutral, Not Important and Very Not Important, with the results of respondents' answers as follows:

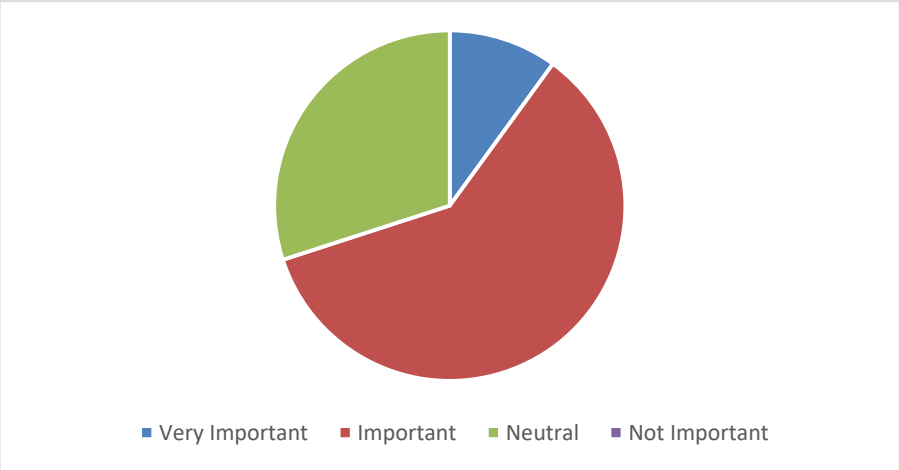

Figure 5. The importance of recommendation systems in the decision-making process of selecting study programmes

From the results of the questionnaire regarding how important system recommendations are in the decision-making process for selecting courses, there were 6 people or 30% respondents stated that the system's recommendations were very important to them. Meanwhile, the majority of respondents, namely 12 people or 60%, stated that system recommendations were important in their decision-making process. There were also 2 people or 10% who answered that they were neutral regarding the importance of system recommendations in making course selection decisions. This may indicate variations in students' perceptions and reliance on system recommendations.

The importance of system recommendations in decision making, as expressed by the majority of respondents, shows that the system has played a significant role in guiding students in determining courses that suit their needs and needs. their interests (Tarke dkk., 2021). However, neutral responses from a small number of respondents indicate that there is variation in the level of reliance on these recommendation systems. Further analysis can be carried out to understand the factors that influence the level of importance of system recommendations for students.

Level of Trust and Ease of Use

The next questionnaire is related to the level of trust and ease of use with the question How much do you trust the system's recommendations in choosing courses? With answer options Strongly Believe, Believe, Neutral, Don't Believe and Strongly Don't Believe. The following results were obtained:

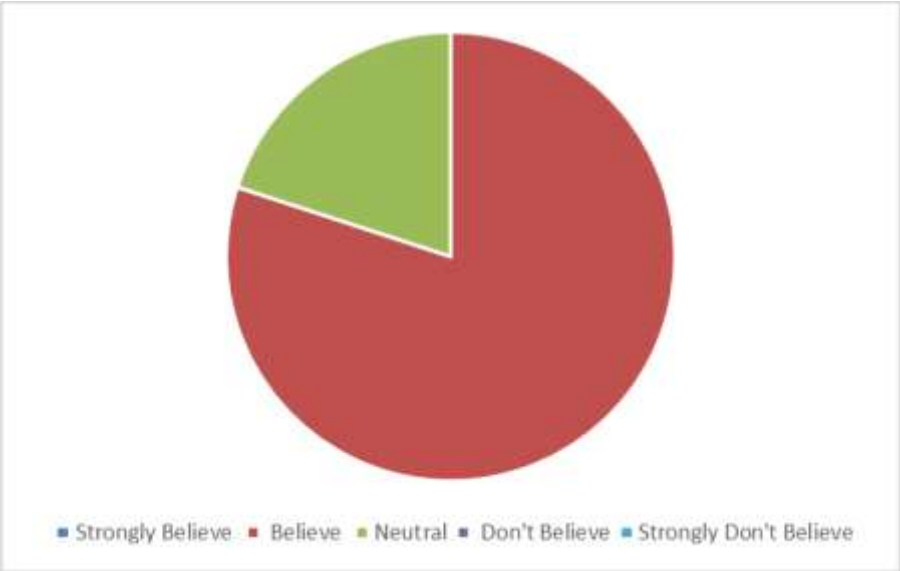

Figure 6. Respondents' trust in the system's recommendation in choosing a course

From the results of the questionnaire regarding the level of trust in system recommendations in selecting courses, 16 people or 80% of respondents stated that they 'trusted' the system recommendations. Meanwhile, 4 people or 20% stated that they were in the 'neutral' category regarding their level of trust in the system. These results reflect that the majority of respondents feel confident in the system's recommendations in guiding them in selecting courses. This high level of trust can be considered a positive indicator of the effectiveness of the recommendation system in providing reliable guidance to students.

While the majority trust the system, the presence of neutral respondents suggests that some students may consider additional factors or have a higher level of trust low on system recommendations. Therefore, further understanding the thoughts and perceptions of neutral respondents can provide deeper insight regarding aspects that can be improved in the recommendation system (Tikva & Tambouris, 2021).

The next question is related to the level of user trust and ease of use. Level of trust and ease of use with the question What is the level of difficulty? or the ease of use of the course recommendation system in your opinion? With answer options Very Easy, Easy, Neutral, Difficult and Very Difficult. The results of the respondents' answers are as follows:

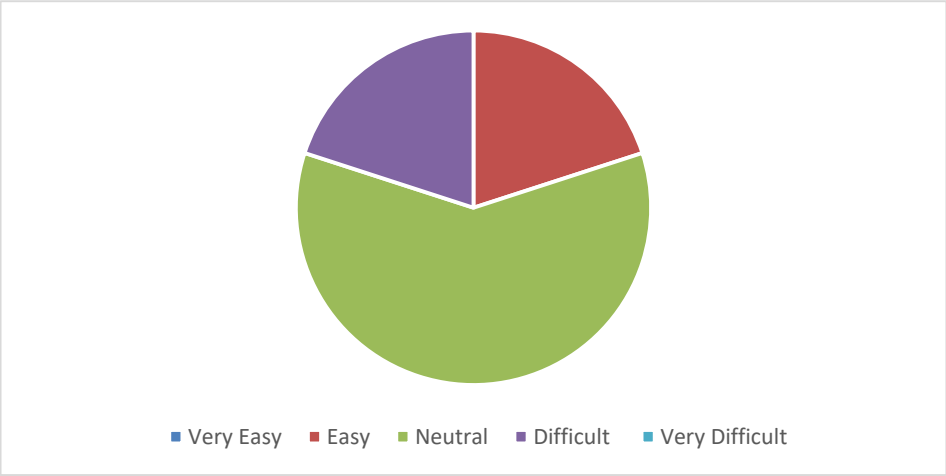

Figure 7. Respondents' results on the level of difficulty or ease of use of the course recommendation system

The results of the questionnaire regarding the level of difficulty or ease of use of the course recommendation system show variations in perceptions among respondents. A total of 12 people or 60% stated that they were in the 'neutral' category regarding the level of difficulty or ease of use of the system. This indicates that the majority of respondents do not have a clear perception regarding the level of ease or difficulty in using the course recommendation system. Meanwhile, 4 people or 20% of respondents stated that they found it 'easy' to use this system, while 4 other people or 20% stated that they found using the system 'difficult'.

These results highlight the need to better understand the factors that influence user perceptions regarding the level of difficulty or ease of use of recommendation systems. Some respondents may find the system easy to use due to the intuitive interface or clear guidance, while others may experience difficulties due to lack of familiarity or specific reasons. Further analysis of individual responses and detailed evaluation of the user experience may provide deeper insight into how to improve the interface and functionality of the system to ensure greater affordability and user convenience (Putera dkk., 2022).

CONCLUSION

From the results of the questionnaire, it can be concluded that the majority of respondents have previous experience in using a course recommendation system, where 80% of the total respondents stated that they had used the system. The frequency of system use also shows that the majority of respondents use this system regularly, either frequently or always. Even though the majority were satisfied with the recommendations provided, there were a number of respondents who were still neutral, leaving room for further understanding of the factors that influence user satisfaction.

In the context of course selection decisions, the majority of respondents tended to follow system recommendations, especially who stated that they always or sometimes followed the recommendations. However, there is a small number of students who prefer not to rely on system recommendations and choose the option of choosing their own courses. Even though the majority felt that system recommendations were very or important in the decision-making process, the presence of neutral respondents showed that there were variations in perceptions regarding the importance of system recommendations in making course selection decisions.

In terms of the level of trust, the majority of respondents stated that they believed in system recommendations, shows that this system has built a fairly good level of trust among users. However, regarding ease of use, there were variations in respondents' perceptions. Although most felt neutral, a number of respondents stated that they found using the system easy, while others found it difficult. Further analysis is needed to understand the factors that influence user perceptions regarding the ease of use of course recommendation systems. Overall, the questionnaire results create a rich picture of user experiences, course selection decisions, and perceptions regarding the level of trust and ease of use of the course recommendation system. Further analysis can provide deeper insights and guide the development of systems that are more effective and appropriate to student needs.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

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