Integrating LLM-Based Course Recommendation Systems in Academic Advising: Impacts on Student Decision-Making and Trust

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for the Thesis-Related Assignments

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Introduction

Academic advisors are an important part of higher education as they play a crucial role in student retention and guidance throughout their college degrees (Drake, 2011). Effective and efficient advising consists of not only answering questions about course selections, but it also addresses personal and professional goal questions. However, as institutions grow, and different advisors for some majors become overwhelmed by the sheer number of students within the major (such as the high advisor-to-student ratio in computer science departments), exploring the integration of technology in advising has become an area of growing interest. Given the emphasis on the importance of academic advising in engineering education, a recent study showed that a machine learning algorithm leveraging academic data on students improved the process and overall quality of support advisors were able to give to students (Maphosa, Doorsamy, & Paul, 2024). In addition, technologies such as advising chatbots, powered by Large Language Models (LLMs), have demonstrated capabilities in answering common student inquiries (Lucien & Park, 2024). LLMs have grown in public potential, especially in the field of artificial intelligence. Therefore, there is potential to integrate this technology to support current academic advisors in higher education by providing personalized course recommendations and answering common inquiries. However, integrating LLMs into advising jobs also raises concerns regarding the accuracy of information, given the need for a high level of trust in this system (Drake, 2011). Additionally, there is the issue of maintaining the integrity of the role of advisors, as LLMs would be answering some questions traditionally handled by human advisors.

This research aims to explore these concerns by investigating how LLM-driven course recommendation systems influence student decision-making, trust in academic advising, and how these systems might work in tandem with human advisors. Through an analysis of existing

literature and case studies, this study seeks to assess whether AI-driven advising can enhance student outcomes while maintaining the essential human elements of academic guidance. By applying an Actor-Network Theory (ANT) framework, this research will evaluate the interactions between students, advisors, AI systems, and institutional policies to determine how AI can be effectively integrated into academic advising without diminishing the value of human advisors.

Problem Definition: Modern Academic Advising and Possible AI Integrations

Importance of Course Selection and Academic Advising

In higher education, proper course selection plays an important role in how students perform and contributes to their overall motivation. Research done by Lynch, Seery, and Gordon (2011) found that when students' dominant interests align with their chosen courses, they perform better academically. Therefore, this suggests that students who are more intrinsically motivated by their interest in coursework become more engaged, persist longer within their degree path, and also achieve higher grades compared to those whose interests and courses are misaligned. This misalignment can lead to, as highlighted by Lynch et al. (2011), disengagement shown by students transferring out of engineering programs into more aligned disciplines. Therefore, a major part of effective advising should focus on details regarding guiding students toward courses that align with their strengths and curiosity, rather than simply checking off degree requirements.

Recognizing the significance of course alignment, academic advising serves as a key resource for ensuring that students make informed choices that support both their academic success and long term goals. As higher education becomes the standard for opening a larger pool

of opportunities for future work, and the cost of tuition can be seen as a large investment towards a student's career, the ability to provide an environment where the student can succeed is crucial. Academic advising plays a crucial supportive role in the successes of students in higher education, especially in regards to student retention, engagement, and overall academic performance. Researchers at Louisiana State University (LSU), performed large surveys that showed how grade point average (GPA) of students can be positively influenced by their advisors, in addition with a students overall satisfaction with their university experience (Hawthorne et al., 2023). Effective advising clears up any confusion by helping students navigate complex academic requirements, making informed course selections, and building necessary studying skills. In addition, perceived support and accommodation that an advisor can provide for each student was determined as a key predictor of success by providing them with a sense of moral support, keeping them engaged towards their degree progress (Steele et al. 2018). However, this level of results in advising must also be paired with the university's ability to provide enough advisors to accommodate each student.

The effectiveness of advising heavily depends on the advisor-student ratio at universities and within specific departments. At universities with a higher number of student enrollments, such as Southern Polytechnic State University, a single advisor may be responsible for over 1,200 students (Khalid & Williamson, 2014). This disparity creates major challenges when trying to provide any personalized guidance or accommodations for students. In cases with an imbalanced advisor-student ratio, the effectiveness of academic advising diminishes due to the lack of quality that an advisor can give to students. Further, inadequate support and advising delays could negatively impact student success, due to a lack of guidance. When left with little

guidance, students must then resort to navigating the existing advising tools located in various places.

Traditional advising tools are resources such as course catalogs, degree audits, and other various university related information. However, these tools can be extensive with dense information, frequently changing, and overall limiting in their overall assistance for students. Catalogs and audits provide essential information about available courses and vague directions on degree requirements, but they lack interactive and personalized support in regards to advising, due to varying needs for students. Therefore, without the proper accommodation and balanced advisor-student ratio, a challenge of accessibility is created, particularly for students who may require additional guidance (Khalid & Williamson, 2014).

To address these challenges, some technological advising tools have been developed to assist in student advising. Some universities have adopted an AI-driven chatbot that is able to answer FAQ-based questions related to advising such as deadlines, policies, and procedures (Xie et al., 2022). Tools like this build upon the traditional information, dumped resources that universities provide to students in regards to courses and degree requirements. Technological integrations, such as LLMs, provide slightly more assisted guidance during times in which human advisors cannot.

Knowledge Gap: Impact of AI-Driven Advising on Student Decision-Making

There is limited research on how AI-driven advising, specifically LLM-based systems impact student decision-making and trust in academic advising, and the overall effectiveness on student performance. Although AI chatbots were made in a previous study in regards to answering FAQs, there still lacks much research that has explored how LLMs can personalize course selection and the role of human advisors in an AI-integrated advising system. Therefore,

this study aims to bridge this knowledge gap by applying an ACT lens. By researching and exploring how the different actors interact within an AI-integrated advising system, insight on how AI can be ethically and effectively play a role in academic advising, while also preserving the need for human elements.

Research Approach: Exploring AI in Academic Advising through Actor Network Theory

Actor-Network Theory as the Theoretical Framework

To better understand the potential role that AI could have in advising, ANT serves as a useful theoretical framework for examining the complex relationships within the advising ecosystem. ANT provides a way to analyze how different actors, both human and non-human, interact to shape advising outcomes. Rather than viewing academic advising as a linear, one-to-one interaction between an advisor and a student, ANT highlights the complex web of connections that influence the advising experience.

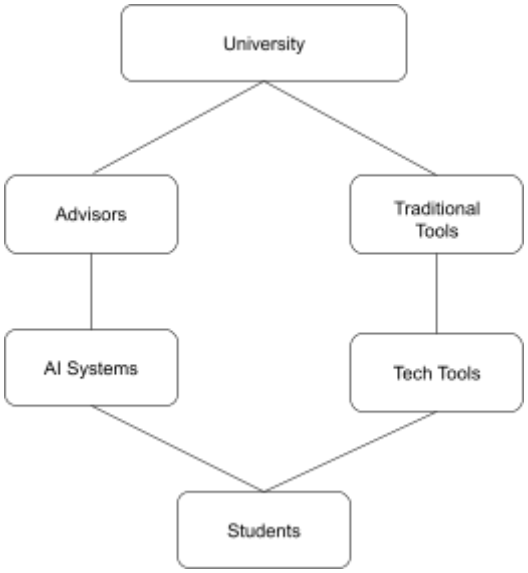

Figure 1. Actor-Network Theory representation of academic advising with AI Systems *(created by Author)*

Viewing academic advising through an ANT lens suggests that it is not just a single relationship between advisor and student, but rather an interconnected system involving multiple actors. Some of the major actors discussed above include students, advisors, traditional tools, technological tools, and the universities themselves. Each of these actors operates within a network where their roles and influences are constantly shifting, depending on institutional policies, technological advancements, and individual needs. Each of these actors plays a role in shaping how academic advising is experienced in higher education (Latour, 2005). As Latour (2005) explains, "Technology is not merely a passive instrument but an active mediator in shaping human actions and interactions." From this perspective, AI is not merely a tool but an active participant that influences the relationships between students and advisors. By integrating AI into advising networks, new dependencies and interactions emerge. Students may begin to rely more on automated suggestions, advisors may shift towards interpretative rather than prescriptive roles, and institutions may reshape their advising models to accommodate AI-driven insights. However, the extent and nature of AI's influence in academic advising remain open questions, highlighting a significant knowledge gap that this study aims to explore.

To investigate and analyze the impact of LLM-driven course recommendation systems on student decision-making and their role in academic advising, this study will primarily use ANT as its guiding framework. By applying this approach, the study will consider not only how AI interacts with students and advisors but also how it reconfigures power dynamics, trust, and the decision-making process within the advising ecosystem. Specifically, by applying ANT, this research will examine prior studies, real-world implementations, and forum discussions to assess whether LLM-assisted advising can establish itself as a reliable and trusted component of the current academic advising environment. This analysis will focus on factors such as student

perception of AI-generated recommendations, the level of autonomy retained by advisors in AI-supported advising models, and the ways institutions implement AI tools to balance efficiency with personalized support. By doing so, this study aims to provide a more comprehensive understanding of whether AI can enhance academic advising or introduce new complexities that require further adaptation.

Research Methodology: Mixed-Methods Approach

This study will use a mixed-methods approach that will draw upon case studies and systematic literature reviews. The following are some key sources that will be used as evidence and talking points throughout this analysis.

Research done by Sperling et al. (2022) will serve as primary evidence regarding how Actor-Network Theory (ANT) can be applied to education as a whole. This research applied ANT to examine, in a broader context, the relationships between machine learning and AI tools integrated in existing educational systems. Although academic advising was not the primary focus of this piece of evidence, the connections can be linked and specified for academic advising.

Thottoli et al. (2024) was a case study about AI-powered systems, specifically how an AI-driven chatbot assisted in academic advising with a primary goal of taking on responsibilities and alleviating advisor workload. This case study demonstrated a mutual relationship between advisors and AI systems, in which the chatbots were able to address more routine based questions while human advisors had opportunities to address more personalized inquiries. This source also presents limitations of AI systems in an advising environment, but overall, provides insights about possible dynamics between the two actors.

A study by Bilquise et al. (2024) provides survey data on student perceptions and trust given an AI advising tool. This survey study investigated student feedback on an adopted AI chatbot, specifically differentiating how useful the chatbot might be versus how trustworthy the students perceived the answers to be.

Methodology

1. Analyzing and performing literature reviews about AI integrations in advising/education
    a. From this build “knowledge graph” of ANT interactions and relationships
2. Key insights from case studies
    a. Analyze existing case studies to identify the best methods in which AI/LLM services can complement current advising practices
    b. This also includes best practices to achieve positive student perceptions of technology
3. Draw comparisons between Trust and effectiveness in current advising practices versus those with AI-assisted advising

A mixed-methods approach of utilizing case studies, using theoretical analysis with an ANT lens, and an inclusion of student perception data allows for a comprehensive understanding of how the relationship between LLM-powered advising systems and academic-decision making can fall into place within academic advising. With values of evaluation being trust, usability, and overall advising environment effectiveness, this study aims to provide evidence based recommendations for integrating AI into academic advising, without making the role of human advisors obsolete.

Results and Insights: Key Findings on AI Integration in Academic Advising

AI-Driven Advising Enhances Efficiency but Lacks Personal Connection

This section presents key insights derived from the analysis of case studies, literature, and student perceptions regarding the integration of LLM-powered course recommendation systems into academic advising. The findings reveal the transformative potential of AI-assisted advising while also highlighting critical limitations related to trust, accuracy, and student-advisor relationships.

AI-Driven Advising Enhances Efficiency but Lacks Personal Connection

A major finding is that LLM-based advising tools significantly improve the efficiency of course selection by providing immediate, data-driven recommendations. A study analyzing AI-powered advising systems found that 85% of students who used AI chatbots for routine academic inquiries reported faster response times compared to traditional advising methods (Thottoli et al., 2024).

However, while AI tools can rapidly process degree requirements and optimize scheduling, they fail to account for the deeper, subjective elements of advising—such as student motivation, career aspirations, and unexpected life circumstances. As Sperling et al. (2022) demonstrate in their ANT analysis of AI in education, technology's impact is shaped by the broader human network, meaning that an AI tool's recommendations are only as effective as its ability to integrate with existing advising structures. As an example of what may occur in the implementations discussed in this section, a student choosing between two electives may receive an AI-generated recommendation based on historical course difficulty and grade distribution. However, only a human advisor could recognize that one course aligns better with the student's career aspirations and networking opportunities. This also can be seen in the study where 42% of students believed AI chatbots provided personalized recommendations tailored to their academic

and career goals (Bilquise et al., 2024). However, this challenge of personalization ranges in spectrum. LLM-systems can increase personalization depending on how much user data is stored or inputted as context. Therefore, if more student data including transcript, career goals, and personal interests were to be provided, then the recommendations systems could be curated better. However, this still holds a barrier of any lack of emotional connections. Students inquiry advisors about more than just academic requirements, but rather a spectrum of inquiries that encompass the need for emotional support and motivation – elements that are crucial for student success that the discussed AI systems cannot replicate.

Trust in AI Advising Remains a Barrier

Klingbeil et al. (2024) and Blisquise et al. (2024) complement one another as they give insight on the significance of trust in AI-advising adoption, especially given any outcomes of overreliance on the technology. Klingeil et al. (2024) found that individuals, especially those relying on a completion of a task, tend to over rely on AI-generated advice, causing them to possibly ignore any contradictions in contextual information or even their own judgement. Therefore, this could lead to inefficient outcomes, not only for the decision maker but also for any party involved in the decision being made. As further suggested, users may be captured by the mere knowledge of advice being generated by AI technology, causing them to place undue trust within the system, despite the lack of justification for the recommendations. Blind trust within the adoption of this technology can be problematic for decision making and extremely troublesome for students if inaccurate information is given to students that rely on such technology.

The UAE survey data from Bilquise et al. (2024) further emphasizes the importance of trust in AI-driven advising systems. Among the 207 university students surveyed, 78% expressed

concern over the accuracy of the AI-driven advising system. The primary reason for their fear was due to skepticism and fear of any incorrect information or misleading advice that may be given, could cause them to take the wrong steps and decisions. More specifically, when questioned if an AI-advising system were to operate without any checks and balances by a human advisor, or any human oversight, the percentage of trust within the students dropped by half to 39%. This student perception is important due to the understanding that in reality, these technologies and human advisors will be connected in some way as actors through an ANT lens. Therefore, when isolated from one another, the level of individual trust may be lower compared to when they are seen as a joint system of influence. In the same study, the student researchers analyzed the feedback and concluded that the perceived usefulness of the overall AI-driven system did not significantly increase the positive feelings towards an adoption, but rather trust within the system was more important. Therefore, trust is seen as a primary factor influencing student acceptance. This aligns with the findings within the study done by Klingbeil et al., which suggest that trust in AI systems that are poorly calibrated or have no other form of justification, may lead to an overreliance or outright rejection of the technology.

AI-Assisted Advising will Reshape Student-Advisor Relationships

One of the most compelling insights is that AI tools do not necessarily replace human advisors but rather redefine their role in academic guidance. The introduction of AI chatbots and LLM-based course advisors creates a hybrid model where human advisors take on a more strategic and mentorship-focused role, while AI handles routine tasks.

However, this shift also presents challenges. If students begin relying too heavily on AI for course selection, they may disengage from human advisors, missing out on the benefits of mentorship, networking, and holistic academic planning.

Table 1

Changing role of advisors in an AI-integrated advising system (created by Author)

Aspect	Traditional Advising	AI-Integrated Advising
Course Selection	Manual guidance from advisor based on experience	AI-generated recommendations based on built knowledge base
Mentorship and Career Guidance	Advisor discusses career paths and goals	Human advisor remains essential for long-term career planning
Availability and Accessibility	Limited by office hours and appointment availability	24/7 access to AI for basic advising queries
Decision Transparency	Clear explanations from advisors	Potential lack of reasoning behind AI recommendations

This proposes the major changes and shifts in responsibilities that traditional, human advisors might take on versus what an AI-integrated advising system could have. The majority of the responsibilities that the AI-advising tool would take on would be highly repeated tasks that do not touch upon any human emotions, but rather frequently asked questions or recommendations related to highly restricted degree requirements. Human advisors continue to excel in long term decision making influence, along with the emotional connection and empathy that some students may need for academic support and motivation, which AI-tools will not be able to successfully provide. By applying an ANT perspective, this research highlights the necessity of balancing automation with human judgement, ensuring that AI advising tools enhance, rather than diminish, the student experience.

The integration of AI into academics presents some clear advantages in efficiency and accessibility, however, its broader implications can extend beyond task automation. If AI-generated recommendations were to become more prevalent, students may develop and internalize a new form of academic decision making. One that is more data-driven, but

potentially less exploratory. In addition, if AI is built not only through accuracy but through transparency and explainability, institutions and administrations should actively shape how AI falls into an academic advising setting.

CONCLUSION

Within this study, the evidence discussed and the analysis performed, suggests that integrating an LLM-driven course recommendation system, or any AI-driven advising tool into academic advising, will not replace the actors within the traditional system, but rather reshape the network of relationships that define the advising experience. Through an ANT lens, academic advising is not merely a simple exchange of information between a study party and an advisor party, but rather a culmination of complex interactions between different actors. Therefore, integrating AI is not simply a tool added, but rather an active participant within this network, influencing and being influenced by human advisors, university policies, and other students.

Further, as with any system that newly adopts new technology, the reconfiguration of relationships within that system, in this case the advising network, raises concerns about the shift in student engagement with human advisors. However, even with concerns about whether shifting towards an AI-centric advising will alter student academic decision making. Given a system that can dependably respond with accurate information, by limiting its scope, there still then exists limitations with AI capabilities in general.

This study highlights that in an AI-integrated advising system, the actors of an AI tool and advisor are not competing influences, but rather complementary actors within an academic advising system. Well structured AI-tools will be able to shift the priorities of human advisors from repetitive information dumping to more complex, high-impact interactions more focused on

career counseling, discussing personal challenges, and providing emotional support and motivation to students. By developing a balance between automation and human judgement, higher education institutions may be able to integrate AI-driven advising to work towards a future where human expertise can be complemented by AI-driven technology for a better student experience.

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