Developing an Innovative Gamified AI-Powered Application to Help Computing Students Choose Their Specialization

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***Abstract*– Selecting a specialization is a pivotal decision for computing students, as it significantly shapes their academic progression and future career prospects. However, many students struggle with this choice due to generic advising methods and a lack of personalized support. Traditional academic advising often fails to account for students' unique interests, skills, and long-term career goals. Research shows this can lead to uncertainty and a mismatch between their academic paths and professional aspirations. This study investigated the development of a gamified artificial intelligence (AI)-powered application designed to assist second-year computing students at a Jamaican university, who select their major in that academic year. The application used AI and fact/rule-based logic to assess student competencies to deliver personalized recommendations based on student interests and goals. Gamification techniques such as interactive challenges, role-playing simulations, and feedback loops were also applied to increase engagement and motivation to enhance decision-making confidence and improve the advising experience. Prior to development, the study employed student surveys and faculty interviews to assess the platform's potential usability and effectiveness. This novel approach to academic advising by merging gamification with engaging learning strategies aims to transform how students navigate specialization decisions in dynamic and evolving computing fields.**

***Keywords*-- academic advising, artificial intelligence, gamification, specialization selection, student engagement.**

I. Introduction

Choosing an area of concentration or a specialization in computing is one of the most critical decisions that students must make, as it significantly influences their academic journey and future career paths. Without the necessary career guidance, student aspirations towards good careers may result in low ambitions to succeed [1] and a lack of clarity on how their chosen specialization aligns with their personal strengths, academic performance, and career aspirations [2]. This disconnect can lead to uncertainty and poor decision-making, which may hinder students' academic success.

In today's fast-paced technological landscape, students pursuing computing degrees face difficulties in selecting a specialization that aligns with their skills and future aspirations. Traditional academic advising often adopts a one-size-fits-all approach, which typically relies on generic advice often centered around broad industry trends or historical data. This approach does not necessarily consider fully the individual student's academic performance, personal interests, or evolving career goals. Students are frequently presented with basic information about available specializations but are rarely given a deeper understanding of how their specific strengths such as analytical thinking, coding proficiency, or problem-solving skills align with certain fields. This lack of personalized guidance can limit students' ability to make informed decisions about their career aspirations.

Without a structured approach that analyzes a student's skills, influences and long-term goals, many students face the risk of selecting specializations that could limit their future career growth. This lack of clarity can hinder academic engagement, contribute to lower job satisfaction, and even lead to career mismatches [2]. The rapidly changing dynamics of the technology job market, where emerging fields such as cybersecurity, data science, and AI create new career possibilities that may not have existed a few years ago [3] should also be among the considerations for budding computing professionals.

Gamification, most widely described as the use of game design elements in non-gaming contexts [4]. Apart from its use in promoting academic achievement, such as in the evaluation of learning outcomes [5], it has been shown to foster engagement and motivation in educational contexts [6]. As noted by [7], gamification can affect users depending on their characteristics and personality traits, leading to behaviour change.

This study explored the development of an active learning platform that utilized AI to guide second-year computing students in selecting a specialization. Built into the platform were interactive activities based on student input, personal preferences, and interests. An AI-driven recommendation system was used to analyze these factors and provide personalized suggestions for suitable specializations. This gamified platform was designed to engage students through self-assessment tools, interactive challenges, and real-world simulations, giving them a more informed and data-driven basis for making their specialization choices.

Access to tailored recommendations that align with student interests and long-term career aspirations can reduce the uncertainty many students face when choosing a specialization, thereby improving both decision-making confidence and academic satisfaction. For administrators, programme directors and coordinators, such a platform can provide valuable data analytics and insights, allowing for the optimization of advising strategies and the ability to track

student progress more effectively. The study contributes to the body of literature through the exploration of the integration of AI and gamification in academic advising, offering new perspectives on how these technologies can transform educational support, ultimately impacting student outcomes as they select their specializations.

II. Brief Literature Review

Academic specialization represents a crucial decision for a university student. At this stage, academic advising is important to help guide students along paths that steer them in the direction of future employment prospects, taking into consideration their talents, interests, personality traits and other important factors. Traditional approaches to academic advising include group seminars, workshops, and one-on-one counseling. These approaches have been the mainstay of student support systems. While these approaches aim to provide foundational guidance, their ability to address the diverse and dynamic needs of today's students is often limited due to inaccurate and outdated information, insufficient advisor experience and advising time, and the level of effort required for proper guidance [8]. Another major limitation of traditional advising is that it is generalized, which affects students in interdisciplinary fields or those pursuing non-traditional career paths, where personalized advice is often paramount. The evolving role of the academic advisor, who often is the same faculty member delivering classes, comes with high expectations for critical student support [9].

Technology has begun to play an important role in academic advising, with researchers such as [8] and [9] emphasizing its role to enhance and not replace human advisors. There is a call for further research on the use of AI-based electronic advising systems which create resilience and reliability to improve the academic advising process [8]. This is evident in research on the growing use of AI for various purposes in higher education, including support for career services [10]. Gamification leverages game-like elements such as points, badges, and leaderboards to make learning more interactive and enjoyable [4]. More evidence is needed to support its long-term benefits [11], particularly over the long-term, however research has shown that when applied effectively, gamification can provide engaging experiences that impact attitudinal, behavioural and other learning outcomes [5],[6].

Research has begun on ways in which gamification can be connected to AI [12], particularly for personalized learning and in creating adaptive and engaging learning environments. An in-depth review by [13] suggests that studies examining the application of AI in gamified learning cover four main areas: (i) personalisation, which focus on creating personalized learning scenarios which match educational content and challenges to individual interests (ii) adaptive difficulty, which adjust task complexity and difficulty with learner performance (iii) feedback and motivation, to provide real-time feedback to guide and motivate learning, and (iv) predictive analytics and data-driven insights, to provide data-driven insights for enhancing learning experiences. Similarly, the authors in [10] also found evidence of studies supporting four main areas: (i) profiling and prediction, (ii) assessment and evaluation, (iii) adaptive systems and personalization, and (iv) intelligent tutoring systems. There is great potential for AI-powered tools to support student career guidance, such as in offering personalized advice, suggesting appropriate courses and tracking progress, among other areas [14].

The combination of both gamification and AI can result in innovative ways to engage and motivate students towards relevant and personalized career choices using gamification elements that are known to encourage participation and stimulate behaviour change. Incorporating the various factors that affect students' career pathways in such systems can help students to make more informed decisions that align with their preferences, goals [2] and personality traits [7]. Even with the touted benefits of an AI-based gamified system, careful consideration will be needed to address ethical concerns such as algorithmic bias, data privacy and security, as well as the potential for misuse [14].

Given the limitations of both human advisors and concerns raised with technological systems, hybrid advising, which combines human and online elements, has been suggested to better address complex or unique situations that could arise when advising students [15]. System design for an AI-based gamified system can benefit from the use of AI, such as helping to provide engaging content that can be updated periodically without much effort for redesign. According to [16], the use of AI in generating content can help transform dull encounters to meaningful educational experiences, which help with providing immediate feedback for student progress tracking.

This study seeks to expand the sparse literature in the evolving area of AI-based gamification, more specifically, for aligning students' academic paths with their career choices. This novel approach to academic advising by merging data-driven personalization facilitated by AI with engaging learning strategies available in gamified interactions, aims to transform how students navigate specialization decisions in dynamic and evolving computing fields.

Based on the preceding, the study attempts to address the following research questions:

RQ1: What are the key challenges and informational needs of computing students in selecting a specialization, and how can AI and gamified systems assist in this process?

RQ2: How can a gamified AI application effectively guide computing students in selecting specializations, while considering their long-term career aspirations and evolving preferences?

III. Methodology and Data

Data collection for this research was conducted using a combination of quantitative and qualitative methods to ensure a comprehensive understanding of the AI-powered gamified

advising platform's effectiveness. Quantitative data was gathered using a Google form that was administered online. The questionnaire was designed to capture measurable data on students' readiness for AI-driven advising, perceived challenges in specialization selection, and attitudes toward the platform's gamified elements. Though the proposed development of the platform was targeted at second year students, third year students were also included in the survey data collection to ascertain their feedback on the methods of advisement about their specialization and other factors which influenced their choice of specialization. The questionnaire also sought to elicit recommendations regarding their comfort level with the use of AI, as well as motivation-related questions about gamification. Understanding participants' needs and preferences can help to inform the selection of gamified elements [11]. Feedback from a pilot test of the survey helped to identify ambiguities, and improved clarity and relevance. A total of 92 survey responses were collected over the period February to April 2025. After examining the data, there were 87 valid responses. Descriptive statistics were used for data analysis.

Semi-structured interviews were also conducted with three programme directors (PD1, PD2, PD3) for the computing-related degree programmes. These provided deeper insights regarding traditional methods of advisement on specializations and recommendations regarding a platform that could assist with student selection of their majors. Responses were transcribed and analysed in accordance with the research questions.

Ethical approval for the study was obtained from the Faculty's Ethics Committee. Participants were informed of their right to withdraw from the study, the voluntary nature of their participation, and the anonymity and confidentiality of their responses.

System development was done using Java Spring Boot, with Maven used for dependency and build management. The application was designed to be deployed in a Java 17+ compatible environment. PostgreSQL was used to facilitate persistent data storage. The database schema included tables for student profiles and authentication, game results and badge records, and AI-generated competencies and job recommendations. Mentor profiles and scheduling logs were also set up for future system enhancements. For the user interface, HTML5/CSS3 was combined with Java-supported templating engines, with Bootstrap CSS used to facilitate responsiveness. Other considerations were included to facilitate AI and external API integration as well as security requirements.

IV. Findings and Results

Below are the findings from the survey and interviews which provided valuable insights on student perspectives, as well as to inform the design of the gamified AI application.

A. *Demographic Profile*

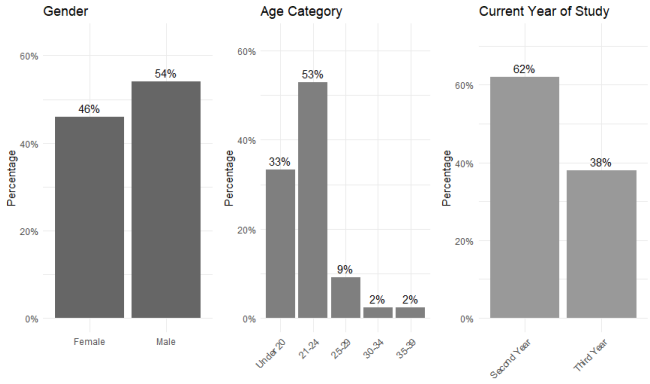

Fig. 1 Demographic Profile of Study Participants

B. *Challenges & Informational Needs in Selecting a Specialization*

RQ1: What are the key challenges and informational needs of computing students in selecting a specialization, and how can AI and gamified systems assist in this process?

For the questions presented in Figs 2 and 3, only those participants in their second year were required to respond given that they were about to select their specialization. However, the responses to the other survey questions were obtained from both second and third-year students to provide broader perspectives surrounding specialization choices, especially since third-year students had only recently selected their specializations and could reflect on their experiences in hindsight.

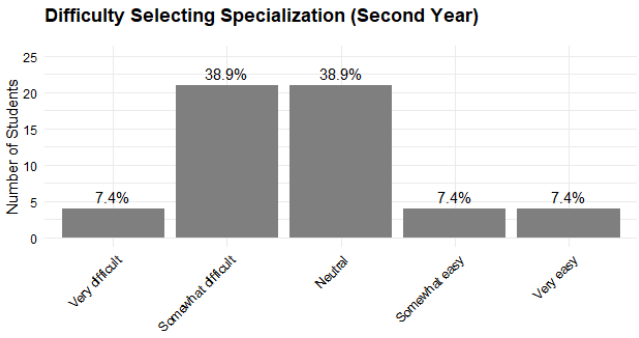

Fig. 2 Difficulty with Selecting Specialization

Fig. 2 shows that approximately 46% of the survey participants who were in their second year expressed some level of difficulty in selecting their specialization while approximately 39% were neutral in their response.

Participants were asked to indicate the factors influencing students' decision to select a specialization (Fig. 3). This

question was asked of the second-year students only. The top four factors revealed were career opportunities (52.9%), salary potential and personal interest (48.3% each), and job security (39.1%).

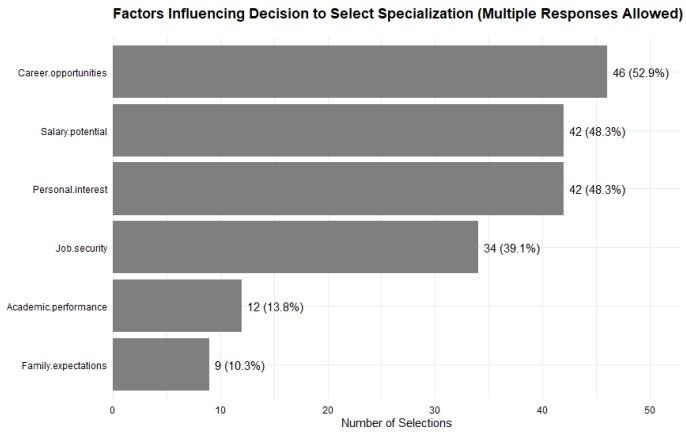

Fig. 3 Factors Influencing Specialization Decision (Second Year Only)

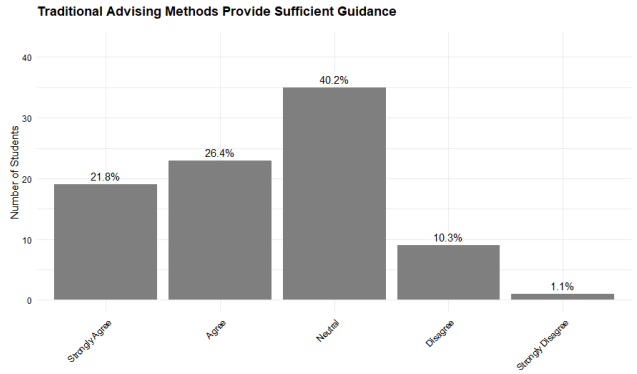

Fig. 4 Traditional Advising Methods & Guidance Provided

More than 50% of both the second- and third-year students were either neutral or disagreed that the traditional advising methods provided sufficient guidance for choosing their specialization (Fig. 4). A significant majority also felt that there was need for more personalized advising systems (Fig. 5).

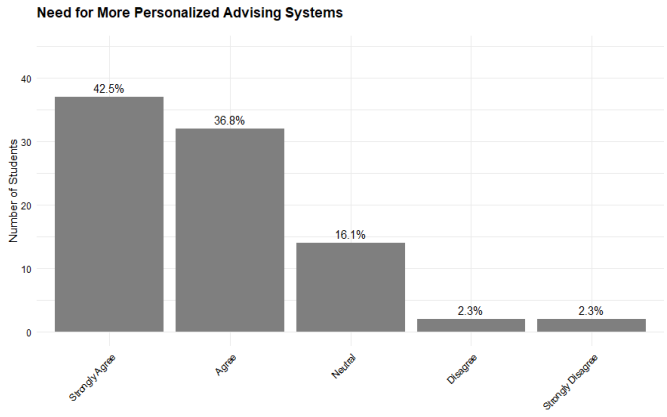

Fig. 5 Need for Personalized Advising Systems

When asked about their interest in an AI-driven platform for assisting with choosing their specializations, an overwhelming majority of students displayed interest (See Fig. 6).

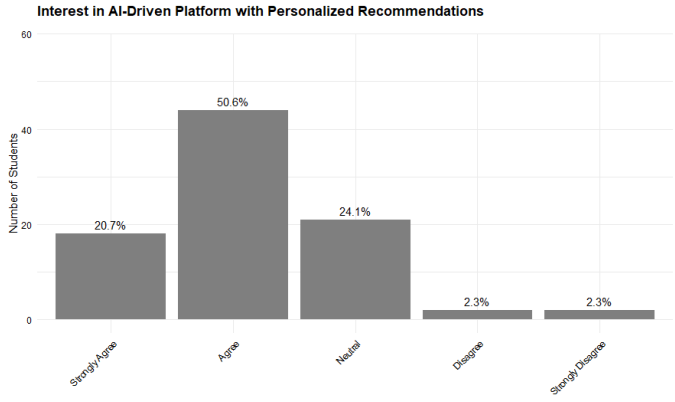

Fig. 6 Interest in AI-Driven Platform

Similar high interest was expressed in a gamified system for assisting with choosing their specializations (See Fig. 7).

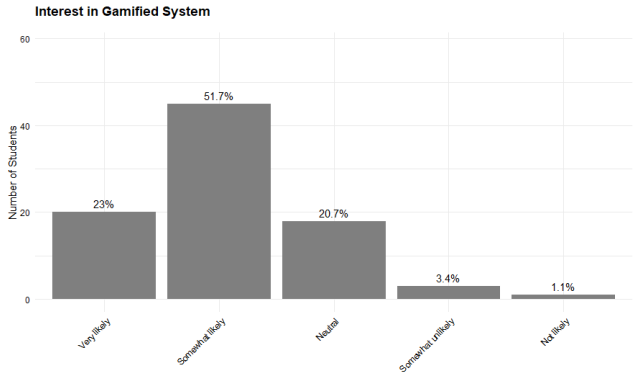

Fig. 7 Interest in Gamified System

Participants were also asked to indicate their likelihood of adopting an AI-powered system for guidance with their

specializations. Fig. 8 reveals that nearly 75% of students would adopt such a system.

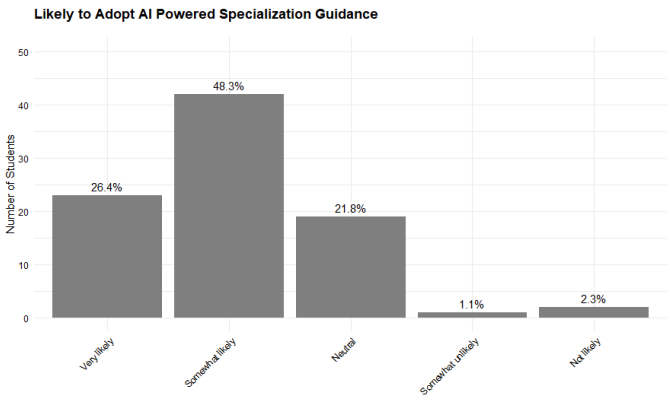

Fig. 8 Likelihood of Adopting AI-Powered System for Specialization Guidance

Students were also asked questions relating to any concerns they possibly had with an AI-driven platform assisting them with guidance on their specializations. Fig. 9 reveals that over 70% of students felt comfortable with the system, and very few (4.5%) were not comfortable.

For trust in the AI-Powered system (Fig. 10), approximately half of the students felt neutral (51.7%), with an additional 9.2% disagreeing with the statement about trust. Only 39% agreed to some extent about trusting the system.

Regarding data privacy (Fig. 11), an overwhelming 95.4% felt that data privacy was either moderately, very or extremely important.

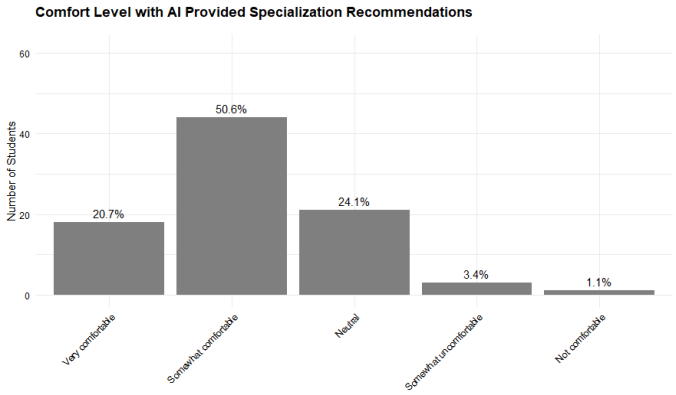

Fig. 9 Comfort Level with AI-Driven System

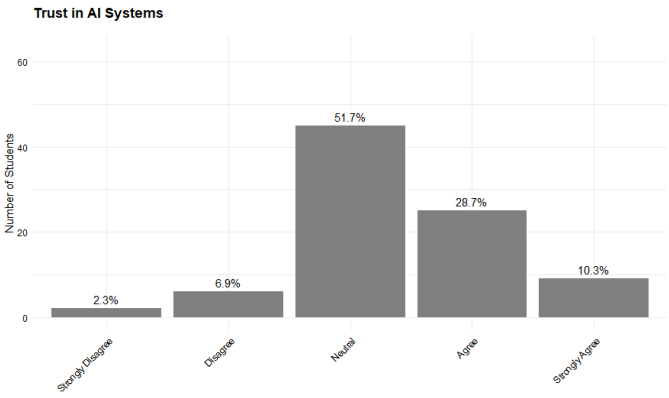

Fig. 10 Comfort Level with AI-Driven System

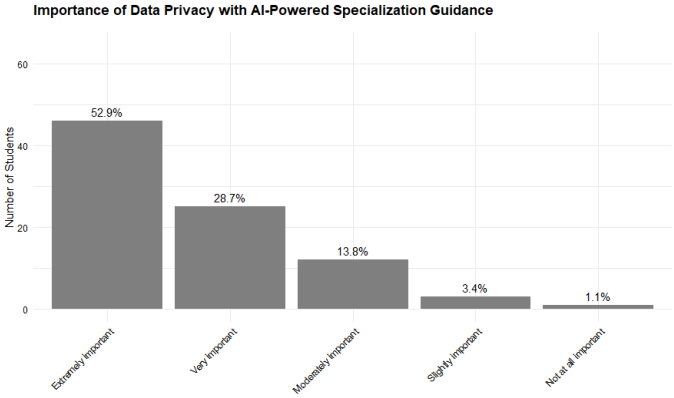

Fig. 11 Importance of Privacy

In addition to the survey responses, interview responses from programme directors revealed a consensus that the current advising framework was only moderately effective. PD1 acknowledged that while the second-year specialization forum was intended to guide students, attendance was often poor leading to many students ending up making decisions without fully understanding their options, and "many students struggle with understanding those specialization choices, based on the questions I see that tend to come after they've made their selections". PD3 similarly acknowledged that academic advising was mostly reactive, with students seeking help only when issues arose. According to PD2, formal advising was notably absent during the early stages of the students' academic journey, leading them to either self-navigate or remain in ill-suited programmes due to lack of guidance and the complexity associated with programme transfers. These insights reinforced the student survey results, which highlighted the inadequacies with the current advising services.

All three programme directors identified a critical lack of awareness as a recurring challenge for students choosing specializations. PD2 remarked that many students asked,

"What can I do with this major?", revealing a disconnect between academic programmes and their real-world career awareness. PD1 noted that "Sometimes students don't even know what career path they're aiming for", while PD3 highlighted how certain specializations were attractive to students based on perception rather than genuine interest or aptitude. These perspectives aligned with the survey findings revealed students often felt unsure or unprepared when making specialization choices.

Despite institutional efforts to engage students, programme directors reported persistently low participation in advising initiatives, resulting in missed opportunities to provide critical information such as scholarship availability and academic pathways. PD1 observed an increasing demand for more personalized guidance, which students were not currently receiving through conventional formats, while PD2 echoed sentiments such as "opportunities are available, but students just aren't utilizing them" and that "We need to move away from assuming that students will always go on the website". PD3 attributed low turnout to possibly poor communication and that "students don't readily access academic advisement". These statements support survey findings that traditional methods like forums and seminars were underutilized.

All three PDs agreed on the need to strike a balance between standardized advising and personalized support. PD1 argued that while standardization was necessary for ensuring consistency in programme requirements, personalization could help to address individual goals and to correct mismatches. PD2 stated that "Personalizing advising is very important, but it depends on the student's situation" and shared that "I try to tailor my approach to each individual because everyone thinks differently". PD3's statement that "students don't always access the resources or ask questions – they make assumptions" suggested that without individualized guidance, students could make incorrect assumptions about specialization requirements.

RQ2: How can a gamified AI application effectively guide computing students in selecting specializations, while considering their long-term career aspirations and evolving preferences?

To help inform the design of the gamified AI application, data was captured on the gamification features that appealed to them most (Fig 12). Participants were able to select multiple options. Progress tracking was the option most selected (77%) while a significant number of persons (approximately 64 - 68%) selected interactive challenges, career adventure mode, and badges and rewards. Role playing simulations, leaderboards, avatars and streaks attracted some amount of interest (approximately 41-51%), while the least selected option was that of escape room scenarios (Fig. 12).

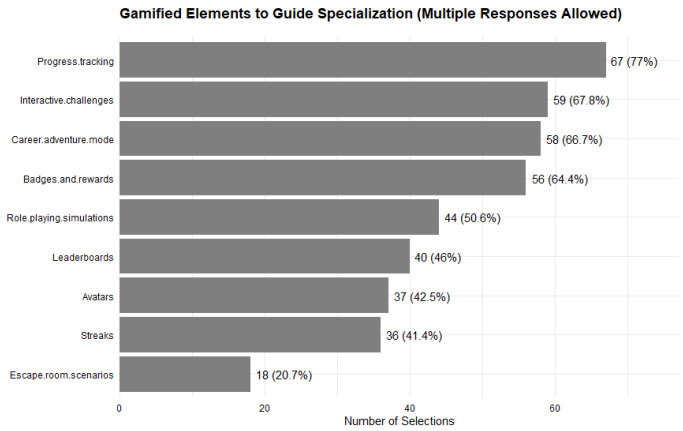

Fig. 12 Gamified Elements of Interest to Students

Regarding the interviews, all three PDs supported the idea that an AI-powered advising tool should go beyond generic information delivery. PD1 suggested "apart from advising, we need something to track students' interests and performance", offering that "if students could input their interests and performance into an AI-powered tool, it could make recommendations for the possible paths they could take". PD2 suggested the inclusion of a chatbot that offered on-demand, programme-specific guidance and links to welfare and financial aid resources ensuring holistic support aligned with students' long-term needs. PD3 described a previously developed student-led AI chatbot initiative and agreed with the development of tools which helped students understand their options and provided confidence in their specialization choices "once students actually use it".

The need for alignment with industry trends was a shared priority. PD1 noted that AI systems could "integrate student data, like interests and performance, with labour market trends to provide career recommendations" to "suggest tailored paths". PD3 suggested that the system to "help guide the program's direction" since "they're already in the field and can offer valuable insights, strategies and advice that we, was educators, may not have", suggesting that embedding such data into an AI platform could close the gap between academic choices and career outcomes. PD2 detailed the importance of industry professionals who participate in academic advisory boards and other such partnerships, hinting that their input could help guide system logic to reflect real-world demand. These insights were very useful, particularly as PD1 noted that "...these newer students are showing growing interest in hybrid specializations - interdisciplinary areas like computing with something outside of computing, so we'll have to assess the need for that and how we can develop it if we recognize it's high."

PDs were enthusiastic about the potential of gamification to make the advising process more intuitive and engaging. PD1 believed it could reduce stress around decision-making, concurring with the sentiments of PD2 who stated that "It will lift a lot of the weight off our shoulders. We'd spend more time dealing with academic issues and other concerns because students would already have career guidance resources in

place." PD1 also expressed support for a reward system so that "the system can track their academic performance and evolving interests". PD3 supported gamification but cautioned that it should be fun, visually appealing, and culturally relevant (e.g., using humour or meme-style graphics) to resonate with younger audiences. PD2 noted that "if students can visually see the different paths they can take based on their decisions, it would help them make better choices... with clear outcomes... and understand the consequences of each path... which would help in their decision-making". These suggestions align with student preferences for interactive and motivating tools. PD1 also noted that "we need to ensure whatever tool we use prioritizes security and privacy".

Given the preceding, a small prototype was designed with limited functionality to demonstrate concepts associated with the following features:

Authentication: Secure and personalized access for students and administrators through a robust login system. Each user is identified by their unique student ID, ensuring data privacy and individualized tracking of academic progress, gaming performance, and AI-generated recommendations.

User Interface Design: An intuitive and visually engaging interface tailored for students. Features include animated dashboards, vibrant pop-up windows, and interactive elements that provide a game-like experience while navigating educational resources, performance data, and major recommendations.

Progress Tracking: Real-time monitoring of student activity across educational games and learning modules. The system should track badge achievements, percentage scores, and overall competency growth, allowing both students and educators to assess readiness for specific career paths.

Gamified Experiences: Each game is linked to specific skill sets and career competencies, awarding badges and scores that influence job role suggestions and academic guidance using a reward-driven system.

AI Insights: AI analyzes current job descriptions and maps them to the skills demonstrated by students through gameplay. This provides personalized job role suggestions aligned with real-world market demand, helping students visualize future careers based on their strengths.

AI Based Report Generation: Dynamic reports generated using AI to summarize student competencies, suggested careers, suitability scores, and recommended university majors. These visually appealing reports aim to support academic counseling sessions and empower students to make data-driven education choices.

As indicated above, a simplified version of the design was developed to validate the feasibility of a gamified AI tool that could assist students with their specializations. For this version, students could earn badges such as Attention to Detail, Creativity and Programming Knowledge, among others. Each badge was associated with several competencies, for example the Attention to Detail badge was aligned with competencies such as debugging and troubleshooting, data validation and error checking, and code review and quality assurance. Competencies were also aligned to an IT career role, for example a cybersecurity analyst role was associated with a sample of 5 competencies including pattern recognition and threat analysis, while a game developer role was associated with algorithm design, storyboarding and other competencies. Each job role and its associated competencies were mapped to several badges proportionally. The job roles were also matched with the majors in the various degree programmes. The weights associated with each competency were assigned based on generalized job descriptions corresponding to the job roles for the purposes of the pilot study. Future development of the system would target notable industry data that can serve as input to the system.

Fig. 13 represents an example of a student who has completed several challenges and earned 5 badges. Given the skills associated with the challenges, and the badges earned, 6 potential careers were identified, and three of the School's majors were recommended.

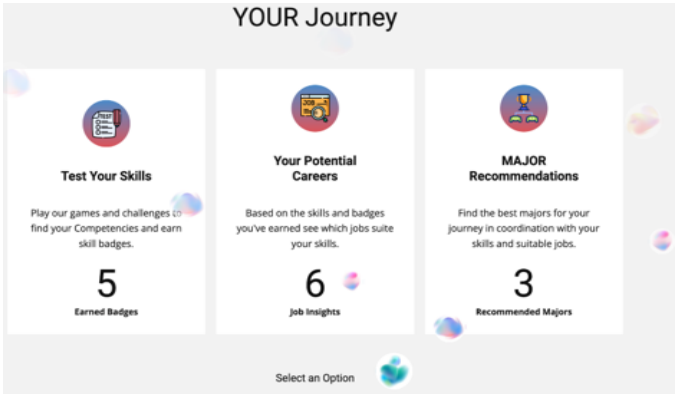

Fig. 13 Example of Application Interface

Fig. 14 shows the level of students' preference for AI recommendations to be supplemented with guidance from human advisors. The results were mixed, with just under half of the students (48.2%) indicating some level of agreement that the guidance should be combined, with 21.8% indicating some level of disagreement. A significant number of students (30%) were neutral.

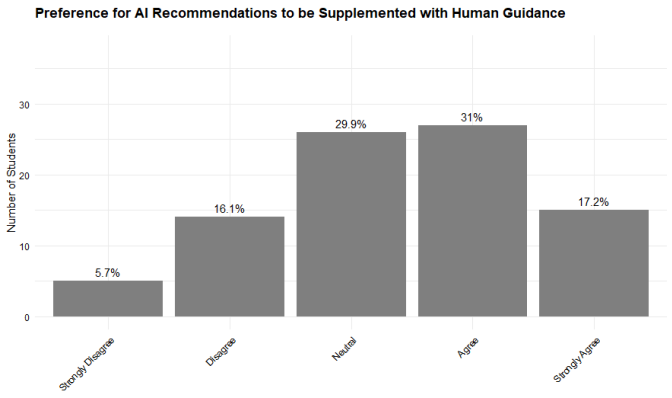

Fig. 14 AI-Human Recommendations

Fig. 15 below shows a cross-tabulation diagram between the students who demonstrated a preference for AI recommendations to be supplemented with guidance from human advisors, and those who were likely to adopt the AI-powered system for guidance with their specializations.

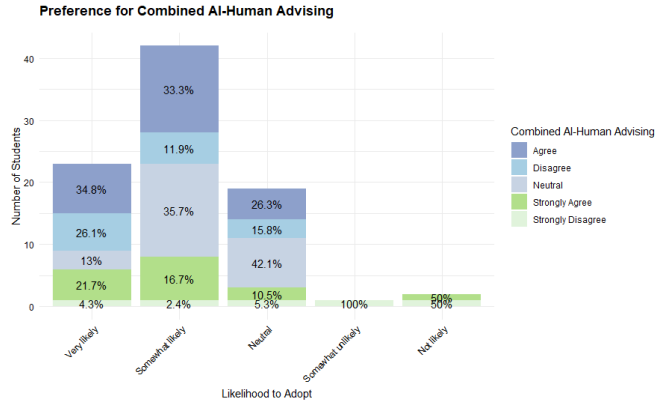

Fig. 15 AI-Human Advising vs Likelihood to Adopt

IV. Discussion

This study was designed to assess the key challenges and informational needs of computing students in selecting a specialization, and how a gamified AI-powered application could effectively guide them in this process. The results revealed that students experienced some level of difficulty in selecting their specialization and felt that traditional advising methods did not provide sufficient guidance to assist them. This is consistent with [8], who noted the limitations of traditional advising methods, and in [9], who discussed several issues related to the academic advising process.

As discussed by [1], career guidance and career awareness seminars are important for students since positive career aspirations do not necessarily lead to strong academic performance. Structuring these seminars, however, may be a daunting task. Qualitative responses from our faculty participants indicated that advisors often faced constraints such as large advisee loads, limited time, and insufficient resources, which often reduce the effectiveness of one-on-one advising sessions. This disconnect highlighted the potential for technology-based systems such as AI and gamification to improve academic advising and help students with selecting their career paths.

Various factors were revealed to influence students' decision to select a specialization, with career opportunities, salary potential and personal interest among the top factors. A significant majority also expressed interest in more personalized advising systems and were open to the use of an AI-driven gamified advising platform to facilitate engagement and the integration of real-world insights in the process. It was important therefore for the platform to have features built in that would address the factors that would support their decision-making and encourage adoption. Students indicated interest in a system with personalized recommendations, several gamified features such as progress tracking, interactive challenges, a career adventure mode, and badges and rewards.

Consistent with some of the concerns raised in [14], data privacy was very important to them. Surprisingly, a significant number (51.7%) were neutral about the statement: I trust an AI system to offer recommendations aligned with my career goals. This suggests that more information may be needed to help students understand the security and privacy issues incorporated into the system, and the implications for system use. Ensuring that student data is protected and that AI use addresses transparency and accountability issues is also important [12]. Care is also needed to handle emotionally sensitive situations when providing career counseling [14].

Another interesting result was the variation among the students who preferred AI recommendations to be supplemented with human guidance. Despite the benefits of hybrid advising touted by [15], not all students appeared to agree with combining human and AI insights, however there was still a significant number, as shown in Fig. 14, who appeared to be comfortable with this feature. Most importantly, an overwhelming majority of students (nearly 75%) indicated that they would adopt the system. Of the number likely to adopt, a great proportion had preference for combined human and AI-based insights (Fig. 15).

The implications of the study are useful, though early, for educators and other stakeholders who are contemplating the use of a gamified AI-based system to address some of the challenges of traditional academic advising. Given that educators do not necessarily adopt gamification-based approaches in regular teaching delivery [17], educational stakeholders will need to be intentional about the development and use if it is adopted to support students on their career paths. Overcoming design and administrative barriers [17] may be necessary. With these issues addressed, the implementation of AI-driven gamified systems has the potential to positively impact student engagement and deep interactions, with further investigations needed to address ethical and other considerations [18].

Faculty members, particularly in computing programmes, may be more inclined to participate in

experiments supporting the development and implementation of these tools, given the nature of the subject domains and the benefits these systems can provide. They are also more likely to ensure that issues such as data protection, privacy and security are addressed to mitigate the risks of using AI-driven gamified systems.

IV. Conclusion and Future Work

There is a growing recognition that traditional methods of advising students about their majors or specializations must evolve to address the needs of learners who are seeking more responsive and personalized support systems to guide their future careers. The enthusiasm shown by students and staff for a gamified, AI-powered advising system highlights the potential for the use of a tool that could provide interactive, customized guidance while also reducing the administrative burden on faculty. The developed prototype showed the possibilities of a system that incorporated AI and gamification in an engaging way to facilitate student exploration of various career options. While time did not allow for a detailed evaluation of the tool or a usability study, these findings provide useful insights that can guide educational designers and other stakeholders in their considerations of effective student support systems to facilitate their career choices and enhanced decision-making.

Future work can involve employing project management methodologies and suitable technologies for large scale design, development and deployment of the tool, given that the prototype was developed as a mere proof of concept. Also important is to map the gamification design to existing motivational theories to assess the impact of individual or collective gamification elements on the level of engagement among students. System testing should also be done to see whether the educational outcomes of academic advising and assisting students with navigating specialization decisions are realized.

Future enhancements could incorporate optional mentor support and chat, where students could have the opportunity to schedule video chat sessions with programme-assigned mentors to satisfy the need for combined AI and human advising. Mini presentations from experts in the respective career areas can also serve as encouragement. Developers should ensure that gamified challenges are updated periodically and including activities aligned to the factors identified as likely to increase adoption. Additional requirements could include integrating the platform with existing student records systems and course recommendations from the university to provide both students and advisors with deeper insights into students' academic goals and progress. A larger scale study can incorporate constructs from validated scales which focus on career decision self-efficacy, decision-making, trust in AI and other relevant constructs with more rigorous statistical evaluation of the tool.

This study was limited by its sample size and its focus on the academic group of second and third-year students from one School at a single university. As such, the findings may not fully capture the advising experiences of students from other faculties, academic levels or educational institutions, hence generalizability is limited. Future research could explore broader analyses of student selection of specialization across other educational contexts and detailed examination of the motivational effects of such AI-powered gamified tools.

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