Gabay Guro: An AI-Powered Tutor Recommendations Using Cosine Similarity and Content-Based Filtering in Progressive Web Applications

A Software Project Presented to the Faculty of the College of Computer Studies (CCS) Department, Gordon College in Partial Fulfillment of the Requirements for the Courses: Application Development and Emerging Technologies, Software Engineering 1, and Human-Computer Interaction

BY

ISKOL4RX (Team 7 | BSCS 2B)

De Guzman, John Chester A.

Diaz, Luise Florenz F

Glodoviza, Jon Zeph R.

Relopez, Thomen Jeilo R.

May 2025

Gabay Guro: An AI-Powered Tutor Recommendations Using Cosine Similarity and Content-Based Filtering in Progressive Web Applications

DE GUZMAN, JOHN CHESTER A.
Author
202311400@gordoncollege.edu.ph

GLODOVIZA, JON ZEPH R.
Author
202310485@gordoncollege.edu.ph

DIAZ, LUISE FLORENZ J.
Author
202311508@gordoncollege.edu.ph

RELOPEZ, THOMEN JEILO R.
Author
202312290@gordoncollege.edu.ph

ABSTRACT

Finding qualified and suitable tutors remains a significant challenge despite advances in digital technologies and artificial intelligence. To address this, Gabay Guro, an AI-powered tutor recommendation system, was developed as a Progressive Web Application using the Agile methodology within the Software Development Life Cycle (SDLC) to ensure iterative development and continuous improvement. The system applies Cosine Similarity and Content-Based Filtering algorithms to provide efficient and personalized tutor recommendations by matching learner preferences with tutor profiles.

The study involved 100 respondents - tutors and learners from Olongapo City - who evaluated the system's usability, functionality, and prototype design. Results revealed strong agreement on the usefulness of filtering tutors by credentials, experience, rates, ratings, reviews, and specializations. Respondents also rated the prototype highly for ease of navigation, visual appeal, clarity, and interaction flow. Overall, the findings suggest that Gabay Guro offers a reliable, user-friendly platform that effectively connects learners with suitable tutors.

Keywords: *Artificial Intelligence (AI), Filtering, Learner, Progressive Web Applications (PWA), Tutor, Tutor Recommendations*

INTRODUCTION

In today's rapidly evolving educational landscape, personalized learning has become essential to address diverse student needs and improve academic outcomes. Tutoring, a tailored educational approach involving one-on-one or small-group instruction, plays a crucial role by providing individualized support that strengthens understanding, addresses challenges, and builds confidence (What is Tutoring and How Does it Differ from Teaching?, n.d.).

Despite the various benefits of tutoring, finding qualified and suitable tutors remains a significant challenge. This issue persists even as digital technologies dramatically expand access to learning through the internet, mobile devices, and online platforms (Hushin, 2025). While artificial intelligence (AI) is transforming education and other industries (Hamane and Khalki, 2024), and smartphones are widely available (Thangamani et al., 2018), efficient and personalized tutor matching has yet to be fully realized.

To address this gap, this study introduces Gabay Guro, an AI-powered tutor recommendation system built into a Progressive Web Application. By leveraging advanced AI techniques, such as Cosine Similarity and Content-Based Filtering, alongside modern web technologies, Gabay Guro streamlines the tutor search process to deliver personalized, efficient, and accessible recommendations. This system not only addresses traditional inefficiencies but also fosters a more inclusive and tailored learning experience, empowering students to reach their full potential.

Objectives of the Study

The general objective of Gabay Guro is to develop a Progressive Web Application that utilizes AI techniques, specifically cosine similarity and content-based filtering, to provide efficient and personalized tutor recommendations. This will enhance the learner's ability to find qualified tutors tailored to their academic needs.

The project has the following specific objectives:

Enhance Tutor Recommendations – Utilize cosine similarity and content-based filtering algorithms to suggest tutors that align closely with individual learner preferences and tutor profiles

Ensure Tutor Verification and Credibility – Establish a robust verification process to confirm tutor qualifications and maintain trust within the platform.

Streamline Session Booking Streamline Session Booking – Develop an intuitive system that simplifies the booking and management of tutoring sessions for both learners and tutors.

Enable Learner-Tutor Connections – Build a platform that connects learners with suitable tutors, fostering opportunities for personalized educational support.

METHODOLOGY

This chapter outlines the necessary steps to successfully reach the goal. These steps include the research design, research location, tools used, validation of tool effectiveness, data collection and management, and statistical data analysis.

2.1 Research Design

This study employed a quantitative descriptive survey research design to systematically gather and analyze data on user interface, system functionality, and prototype evaluation of Gabay Guro. Quantitative descriptive survey design is a non-experimental approach that collects and measures data to illustrate the characteristics, behaviors, or attitudes of a population at a specific point in time (Siedlecki, 2020). This design is effective for identifying usage patterns and user feedback trends to improve the AI-powered tutor recommendation system.

2.2 Locale of the Study

The study was conducted in Olongapo City, a growing urban community recognized for its well-established education system. The city is home to many public and private junior and senior high schools that offer academic and technical programs. The combination of formal education and additional tutoring creates a well-rounded learning environment, making Olongapo a suitable location for studies focusing on educational progress and student performance.

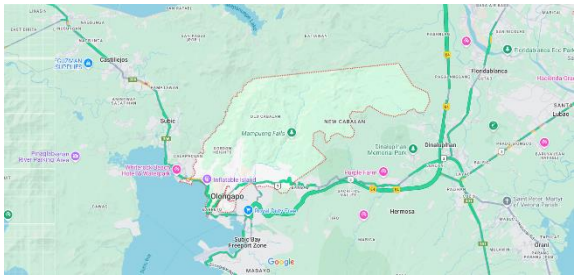

Figure 1. Geographic Location of Olongapo City as Shown on Google Maps

2.3 Population and Sampling Techniques

The population of this study consisted of tutors and learners in Olongapo City, with a total of 100 respondents—50 tutors and 50 learners. Due to challenges in recruiting junior high school learners, the final sample included 40 senior high school students and 10 junior high school students. This study utilized purposive sampling, a non-probability sampling technique. According to Stratton (2024), purposive sampling is a method of selecting participants in which the researcher chooses individuals based on their relevance to the population of interest, specific traits, experiences, or other relevant factors. The chosen sample serves as the study subjects, representing the targeted group or population for the research.

2.4 Research Instrument

This study utilized a Likert scale as its primary data-gathering instrument to evaluate user perceptions of the Gabay Guro platform. The Likert scale enables respondents to express their level of agreement with specific statements related to the platform's user interface, system functionality, and prototype evaluation (Awang et al., 2016). This approach provided a nuanced understanding of user sentiment, which was then quantified and analyzed to uncover patterns and insights that informed the refinement of the system's features.

Numerical Rating	Range	Verbal Interpretation
4	3.25 – 4.00	Strongly Agree
3	2.50 – 3.24	Agree
2	1.75 – 2.49	Disagree
1	1.00 – 1.74	Strongly Disagree

Table 1. Likert Scale Interpretation Guide

Table 1 shows the Likert scale interpretation used in the study. Ratings from 1 to 4 are grouped into four categories: Strongly Disagree (1.00–1.74), Disagree (1.75–2.49), Agree (2.50–3.24), and Strongly Agree (3.25–4.00). This scale helped translate quantitative responses into meaningful qualitative insights.

2.5 Statistical Treatment of Data

The study's data were analyzed using descriptive statistical tools to interpret survey responses related to the user interface, system functionality, and prototype evaluation of Gabay Guro. Respondents' demographic information was assessed using frequency and percentage to understand user distribution across different categories. Scaled responses were evaluated using the weighted mean to determine overall satisfaction and usability scores. A comprehensive analysis enabled the development team to draw actionable insights, informing refinements to the system's design and

recommendation features to better align with user expectations and improve the platform's efficiency.

RESULTS AND DISCUSSION

This section presents and interprets the data collected from both tutors and learners regarding their experiences, preferences, and expectations related to tutoring platforms and services. The findings provide insights into user demographics, decision-making factors when selecting tutors, common tutoring methods, and perceptions of a proposed web-based tutoring application. Quantitative data are summarized in tables and analyzed to identify prevailing trends, user behaviors, and implications for design and functionality. The discussion integrates these results to highlight key takeaways that inform the development and refinement of an effective, user-centered tutoring platform.

ROLE	Frequency	Percentage
Tutor	50	50%
Learner	50	50%
Total	**100**	**100%**

Table 2. Distribution of Respondents by Role

Table 2 shows that the respondents were evenly distributed by role, with 50 tutors and 50 learners, each representing 50% of the total sample. This balanced representation ensures that insights and feedback are equally drawn from both key user groups involved in the study.

EDUCATIONAL LEVEL	Learners	
	Frequency	Percentage
Junior High School	10	20%
Senior High School	40	80%
Total	**50**	**100%**

Table 3. Current Educational Level of the Learners

Table 3 indicates that among the 50 learner respondents, the majority (80%) were senior high school students, while only 20% were from junior high school. This suggests that senior high school students were more accessible or more willing to participate in the study compared to their junior high school counterparts.

FACTORS	Learners	
	Frequency	% of the Respondents
Credentials	50	100%
Experience	50	100%
Rates	35	70%
Ratings	20	40%
Reviews	31	62%
Specializations	36	72%

Table 4. Most Crucial Factors When Booking a Tutoring Session

Table 4 shows that all respondents (100%) consider credentials and experience as key factors in choosing a tutor. Other notable factors include specializations (72%), rates (70%), and reviews (62%), while ratings were considered by 40% of the respondents.

STATEMENTS	Learners	
	Weighted Mean	Verbal Interpretation
I frequently use web apps to find a tutor.	2.98	Agree
I would like to use an app that helps me find tutors more easily.	3.36	Strongly Agree
I am likely to filter tutors based on credentials.	3.60	Strongly Agree
I am likely to filter tutors based on experience.	3.60	Strongly Agree
I am likely to filter tutors based on rates.	3.58	Strongly Agree
I am likely to filter tutors based on ratings.	3.58	Strongly Agree
I am likely to filter tutors based on reviews.	3.64	Strongly Agree
I am likely to filter tutors based on specializations	3.64	Strongly Agree
Average Weighted Mean	**3.50**	**Strongly Agree**

Table 5. Agreement Levels on Web App Usage and Criteria for Filtering Tutors

Table 5 shows respondents strongly agree on using web apps to find tutors and favor filtering tutors by credentials, experience, rates, ratings, reviews, and specializations. While fewer frequently use such apps now, there is a strong overall preference for these features.

TUTORING METHODS	Tutors	
	Frequency	Percentage
Online Tutoring	11	22%
F2F Tutoring	29	58%
Both	20	40%
Total	**50**	**100%**

Table 6. Distribution of Tutoring Methods Typically Used

Table 6 shows that most respondents (40%) typically use both online and face-to-face tutoring methods, followed by 38% who prefer face-to-face tutoring only, and 22% who use online tutoring exclusively.

COMPENSATION METHOD	Tutors	
	Frequency	Percentage
I tutor one subject	10	20%
I tutor multiple subjects	40	80%
Total	**50**	**100%**

Table 7. Distribution of Tutoring Methods Typically Used

Table 7 shows that the majority of tutors (80%) teach multiple subjects, while only 20% focus on a single subject, indicating a diverse teaching capability among respondents.

COMPENSATION METHODS	Tutors	
	Frequency	Percentage
Paid hourly	11	22%
Paid per session	39	78%
Total	**50**	**100%**

Table 8. Distribution of Tutoring Compensation Methods

Table 8 shows that most tutors (78%) are paid per session, whereas a smaller portion (22%) receive hourly compensation.

STATEMENTS	Learners	
	Weighted Mean	Verbal Interpretation
If there were a web app that allowed me to connect easily with potential students, I would find it useful.	3.62	Strongly Agree
If the app allowed me to accept or decline booking requests, this feature would be helpful.	3.54	Strongly Agree
If learners could rate my tutoring sessions through the app, I would appreciate this feedback system.	3.58	Strongly Agree
I am likely to filter tutors based on experience.	3.66	Strongly Agree
Average Weighted Mean	**3.60**	**Strongly Agree**

Table 9. Perceived Usefulness of Web App Features and Tutor Filtering

Table 9 shows that respondents strongly agree that the web app features - connecting with students, managing bookings, receiving session ratings, and filtering tutors by experience - are useful. The overall weighted mean of 3.6 confirms a strong positive view of these features.

STATEMENTS	Learners	
	Weighted Mean	Verbal Interpretation
The flow of navigation in the prototype was easy to understand.	3.74	Strongly Agree
The design of the interface in the prototype is visually appealing.	3.63	Strongly Agree
The layout and structure of the prototype are clear.	3.71	Strongly Agree
The design elements (e.g., buttons, colors, typography) are consistent throughout the prototype.	3.69	Strongly Agree
The interaction flow between different screens or elements in the prototype is intuitive.	3.64	Strongly Agree
The information presented in the prototype is clear and understandable.	3.73	Strongly Agree
It is easy to identify the most important elements on each screen (e.g., buttons, calls to action).	3.73	Strongly Agree
The purpose of each screen in the prototype was easy to understand.	3.63	Strongly Agree
Based on the prototype, I feel confident in the usability and design of the final product once deployed.	3.78	Strongly Agree
Average Weighted Mean	**3.70**	**Strongly Agree**

Table 10. Prototype Usability and Design Feature Evaluation

Table 10 shows that respondents strongly agree on the usability and design quality of the prototype. The highest-rated item was confidence in the final product (3.78), followed by ease of navigation (3.74) and clarity of information (3.73). With a total weighted mean of 3.70, the prototype is perceived as user-friendly, clear, and visually consistent.

CONCLUSION

This study examined the perceptions and preferences of tutors and learners regarding a web application designed to facilitate the process of finding and booking tutoring sessions. The

evaluation focused on users' agreement with the app's features, their perceived usefulness, and the usability and design quality of the prototype.

The following key insights summarize the overall findings from the participants' feedback:

- Respondents strongly agree on the importance of using a web app to find tutors and prefer filtering options based on credentials, experience, rates, ratings, reviews, and specializations. This shows a clear need for a robust and user-friendly tutor selection process.
- The key features of the web app, such as managing booking requests, receiving session ratings, and filtering tutors by different attributes, are perceived as highly useful and relevant by both tutors and learners.
- The prototype's usability and design received excellent feedback, with strong agreement on ease of navigation, visual appeal, clarity of layout, consistency of design elements, and intuitive interaction flow.
- Users expressed high confidence in the final product's usability and design quality once fully developed, indicating the prototype effectively meets their expectations and needs.

REFERENCES

[1] Awang, Z., Afthanorhan, A., & Mamat, M. (2016, April). The Likert scale analysis using parametric-based Structural Equation Modeling (SEM). CEEOL. Retrieved April 30, 2023, from https://www.ceeol.com/search/article-detail?id=418522

[2] Hamane, S., & Khalki, S. (2024, October 3). AI IN EDUCATION: TRANSFORMING THE TEACHING PROFESSION AND UNLOCKING FUTURE OPPORTUNITIES IN ALGERIA. Journal for Educators, Teachers and Trainers. https://doi.org/10.47750/jett.2024.15.04.007

[3] Hushin, H. (2025, March 31). Increasing Global Access to Education with Digital Technology. International Journal of Education and Digital Learning (IJEDL). https://ij.lafadzpublishing.com/index.php/IJEDL/article/view/259

[4] Siedlecki, S., L. (2020, February). Understanding Descriptive Research Designs and Methods. Clinical Nurse Specialist. https://doi.org/10.1097/NUR.0000000000000493

[5] Stratton, S., J. (2024, April 22). Purposeful Sampling: Advantages and Pitfalls. Cambridge University Press. https://doi.org/10.1017/S1049023X24000281

[6] Thangamani, V., Sangeetha, N. & Vijayapoornima, V. (2018). Proceedings of 3rd National Conference on Innovative Research Trends in Computer Science and Technology (NCIRCST 2018): An Android application for tuition finder. ISSN: 2454-4248, 3(4), 59-63.

[7] What is Tutoring and How Does it Differ from Teaching? (n.d.). https://www.targetedprovision.com/blog/what-is-tutoring-and-how-does-it-differ-from-teaching