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Original article

# eTRAKTRAND: A DECISION SUPPORT SYSTEM FOR GRADE SCHOOL STUDENTS TRACK AND STRAND ONLINE EXAMINATION

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**Abstract:** The study presents an online decision support system designed to help grade school students in selecting their preferred track and strand for their senior high school education. The system measures the student's interests, skills, and abilities using an online examination format and generates recommendations for Track and Strands based on their assessment exam results. The study employed a Rapid Application Development model in the development of the system while a mixed-methods approach for a survey questionnaire with a Likert scale rating was used to evaluate the system's functionality, reliability, and usability. The overall functionality mean score of 4.4, reliability of 4.5, and usability mean score of 4.6 implies that the system provides acceptable and accessible valuable decision support system for grade school students' platform for the examinee. More importantly, the results of the evaluations from the end-users show that the eTRAKTRAND is an effective decision support system for grade school students in choosing preferred track and strand for the student to decide on what track to choose for the student Senior High School Education. Lastly, the results can help the School Administrator, teachers, and students to address the challenges of student career decision-making that contribute to their academic career options, and make informed decisions about their future.

**Keywords**: Exam Automation, Decision Support System, Track and Strand, Online Examination, Career Track

## Introduction

Online examination systems in today's society consider to be an examination method that is rapidly expanding. In order to administer assessment tests, aptitude tests, psychometric tests, personality tests, entrance exams, and campus exams, it is used (Choubey et al., 2020). As stated in DepEd Order No. 021 S. The Enhanced Basic Education Act of 2013 (Republic Act No. 10533), which was passed into law on May 15, 2013, is currently in effect. According to the aforementioned law, two years of senior high school will be introduced in order to expand the objectives of high school education to include college preparation, chances for vocational and technical careers, as well as creative arts, sports, and entrepreneurship. Because of this, choose the proper Track and Strand is crucial for preparing students to go to college. The student's capacity must be based on their

knowledge, abilities, and determination. However, the track and strand that must be picked will be dependent on the student's ability. Additionally, the K-12 tracks and strands aim to assist students master their own abilities and be more than prepared to continue on to college, according to a website article from the CIIT College of Arts and Technology. Given the benefit of the extra two years of high school, the significance of passing an exam to evaluate the student's knowledge and preparedness over the previous two years is not considered. The aforementioned examination is conducted across a variety of fields, though, and many people are aware that this is due to the advancement of technology as well as the challenges associated with taking a manual exam. Online exams have developed into a useful supplement to regular exams as a result of the advancement of Internet technology, which is why schools are implementing this kind of approach (Bobde & Chaudhari, 2017). Nevertheless, automation methods gained popularity since they are less time-consuming than manual operations, which are a burden for many people today.

Additionally, Matti Digos City National High School is experiencing this issue. There are numerous drawbacks to this manual style of exam writing. The manual examination method is time-consuming, tiresome, and burdensome, which is why there is a need for a better, quicker, and more trustworthy way to test pupils (Hameed & Abdullatif, 2017). Automation is described in the business news as the taking over of processes by electronics and computer-controlled equipment. Its objective is to boost dependability and efficiency. Automation is, in the words of PC Magazine, "replacing manual operations with electronics and computer-controlled devices," resulting in less fuss and greater effectiveness. The following several years before entering the college years, pupils are required to complete an evaluation exam. For selecting the appropriate subject before attending college, it is a test of career counselling. But when issues arise over time, two extra years have been added to the four years of high school required for entry into college. They referred to it as the senior years of high school, during which you select the track and strand you believe will best prepare you for college entry.

As a result, the researcher aimed to create a decision support system for grade school students' track and strand online examinations in order to assist Matti Digos City National High School students, particularly Grade 10 students, in selecting their fitted tracks and strands in senior high school and to assist administrators and teachers with the problems caused by the manual examination preparation process. Aside from not having to take the exam manually, the system focused on decision assistance, which is used to assist students in deciding which track to take.

**Concept of the Study**

The conceptual framework for the research is shown in the picture below in which different user roles—Super Admin, Admin, and Student—interact with the system in different ways. The central idea of the study is a multifarious user system, as shown in Figure 2. The system's main gatekeeper, Super Admin, is in charge of supervising and coordinating the administrative tasks that support the whole user experience. The Admin users, who have a variety of assigned rights and duties that enable them to carry out crucial operations inside the system, work alongside the Super Admin. Students are the system's primary

users and depend on its functionality to get access to the numerous materials they need for both their academic and personal growth.

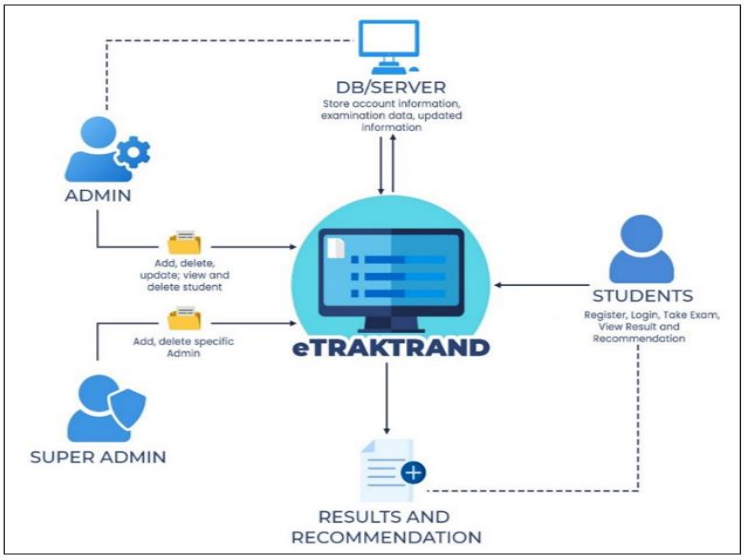


**Figure 1.** Conceptual Framework of the study.

## Methods

The tables 1 shows detailed software used in the development for the "Decision Support System for Grade School Students Track and Strand Online Examination" capstone project. The specified software requirements encompass a diverse array of essential tools and platforms crucial for various computing tasks. Windows 10 Pro, Version 21H2 OS Build 19044.2364, serves as the foundational operating system, offering stability, security updates, and compatibility with modern software applications. Its specific version and build number denote the latest updates and patches applied, ensuring optimal performance and security features. Complementing the operating system, Xampp emerges as a versatile web server solution bundle catering to different architectures. Its compatibility with IA-32 architecture for Windows and x64 architecture for macOS and Linux underscores its flexibility and adaptability across various operating systems. Adobe Photoshop 2020, a leading image editing software, provides users with powerful tools and features for graphic design and photo manipulation. The specification of Adobe Photoshop 2020 ensures consistency in features and compatibility with projects and workflows. Lastly, Sublime Text, Version Build 3211, stands as a reliable text editor renowned for its speed, versatility, and extensibility. Together, these software requirements offer a comprehensive suite of tools essential for a diverse range of computing needs, from web development and graphic design to text editing and programming.

**Table 1.** Software Requirements.

| Name of Software | Specification |
|---|---|
| Windows 10 Pro | Version 21H2 OS Build 19044.2364 |
| Xampp | IA-32 (Windows package only) and x64 (macOS and Linux packages only) |
| Adobe Photoshop | Adobe Photoshop 2020 |
| Sublime Text | Version Build 3211 |

**Table 2**. Hardware Requirements.

| Hardware Requirements | Specification |
|---|---|
| Laptop | Intel(R) Celeron(R) CPU 1000M @ 1.80GHz 1.80 GHz<br>Hard drive capacity (400GB) |

Table 2 displays the computer's hardware specification, which includes detailed descriptions of the machine's parts and features. The laptop's hardware specification includes an Intel(R) Celeron(R) CPU 1000M @ 1.80GHz processor, operating at a clock speed of 1.80 GHz. This processor, while not the most powerful in its class, provides sufficient processing power for basic computing tasks such as web browsing, word processing, and multimedia consumption. Additionally, the hard drive capacity is specified at 400GB, providing ample storage space for storing files, documents, applications, and multimedia content. This capacity allows users to store a significant amount of data without the need for external storage solutions.

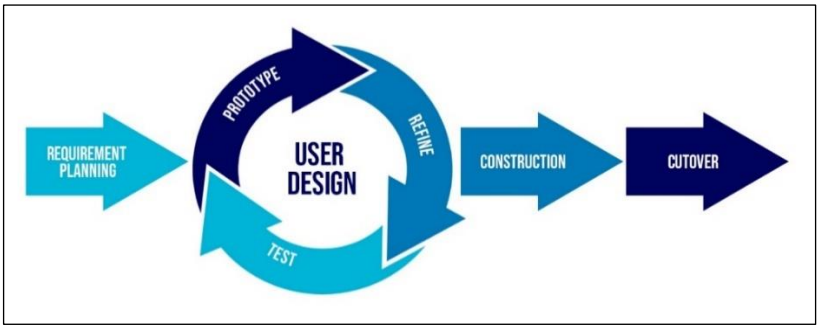


**Figure 2.** Diagram shows the process of developing the proposed capstone project

Figure2 shows the adopted Rapid Application Development (RAD) model as the primary software development methodology for this research due to the several compelling factors. Firstly, the RAD model is renowned for its emphasis on component-based development and short development cycles, making it particularly suitable for projects where time-to-market is crucial. This approach aligns with the research's objectives of expeditiously delivering a functional application system while maintaining high-quality standards. Furthermore, the comprehensive framework of the RAD lifecycle encompasses all necessary steps and activities, from determining business requirements to planning, creating, and implementing the application system, ensuring a systematic and structured approach throughout the development process. The RAD methodology's well-defined goals, specified scope of work, and efficient management system provide a solid foundation for project management and coordination, facilitating streamlined progress and effective resource allocation. Additionally, the RAD model's reliance on reliable and readily available technologies, coupled with manageable technical requirements, enhances the feasibility and scalability of the project. Importantly, the rapid completion facilitated by prototype development allows for iterative improvements and continued user interaction, ensuring that the final product aligns closely with user expectations and preferences. In summary, the adoption of the RAD model offers a pragmatic and efficient approach to software development, enabling the research project to achieve its objectives in a timely and iterative manner (Nalendra, et al., 2021)

**Entity Relationship Diagram (ERD)**

The entity-relationship diagram (ERD) depicts the connections between the objects or concepts, known as entities, within a database, aiding in the comprehension and organization of intricate data structures. Figure 3 below portrays the entity relationship diagram of eTRAKTRAND: A Decision Support System for Grade School Student Track and Strand Online Examination. As shown in the Figure, tables of entity with different attributes were combined together in the database.

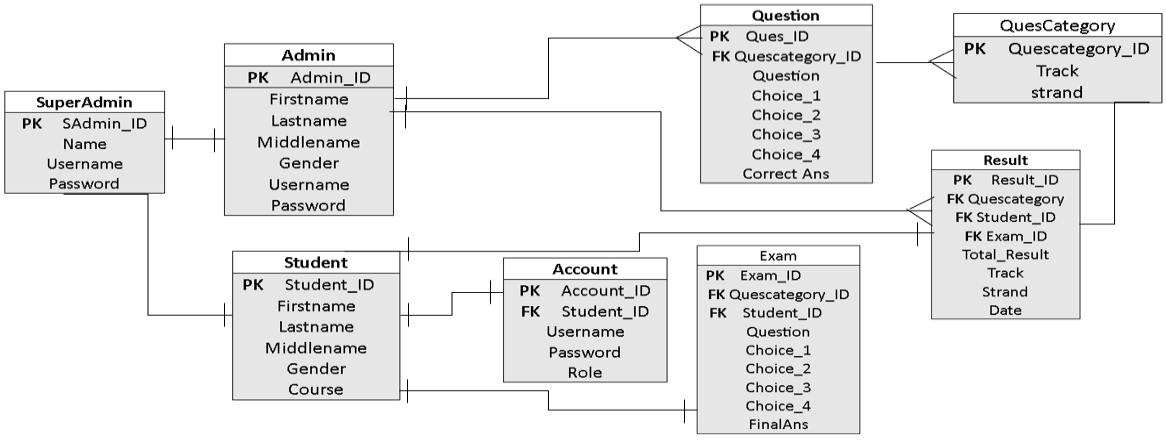


**Figure 3.** Entity Relationship Diagram of the System.

Given the diagram below, eight (8) tables; Admin, SuperAdmin, Student, Account, Question, Exam , result and QuesCategory plays an important role in the eTRAKTRAND: A DECISION SUPPORT SYSTEM FOR GRADE SCHOOL STUDENTS TRACK AND STRAND ONLINE EXAMINATION.

**Use Case Diagram**

Use Case diagram served as a visual representation of the possible interactions between the system and its users, or actors, in various scenarios or use cases that aim to achieve a specific objective. The figure 4 below illustrated the use case diagram of eTRAKTRAND: A decision Support System for Grade School Student Track and Strand Online Examination.

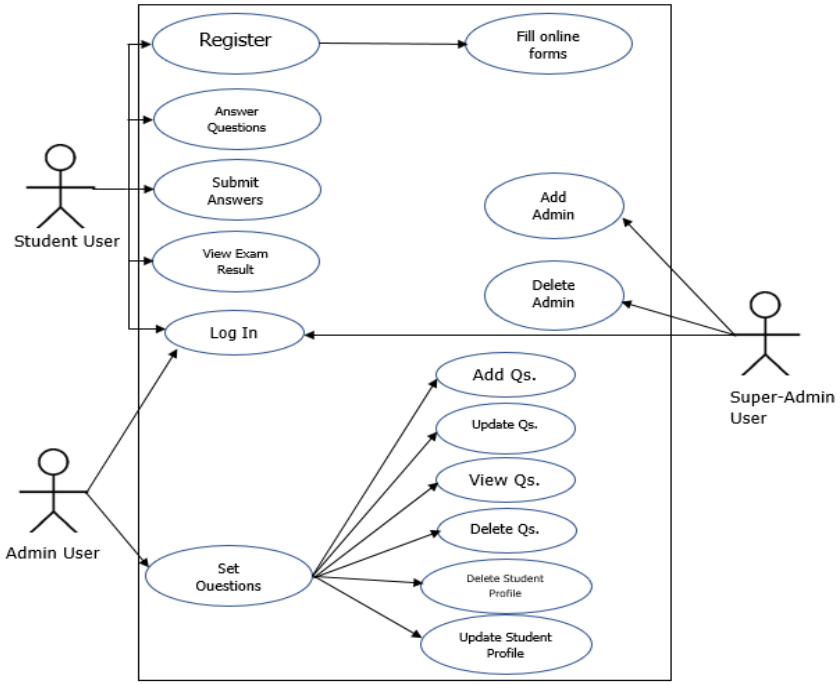


**Figure 4.** Use Case Diagram.

It showed in the figure above that the Use-case diagram of the system has been presented. The users in this system are the (1) student, (2) admin and (3) super admin. Student user can login, register, answer questions, and view exam result. On the other hand, admin user can login, and can set questions while super admin user can only add and delete admin user.

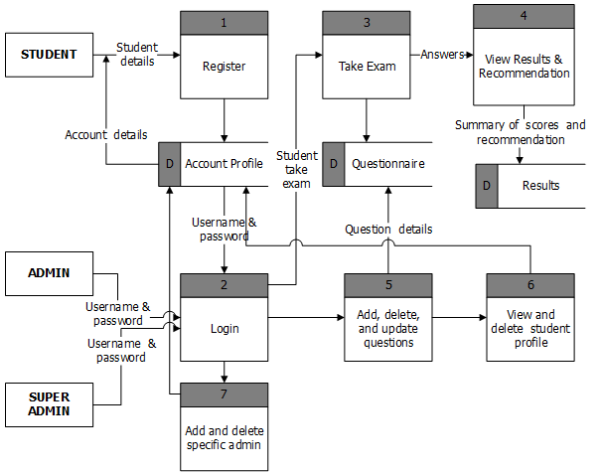


**Figure 5**. Data Flow Diagram for the eTRAKTRAND

Figure 5 provides a comprehensive visual representation of the data flow within the eTRAKTRAND: A Decision Support System for Grade School Student Track and Strand Online Examination. The illustration reveals a rationalized flow of data through the system, facilitating an understanding of its operational dynamics. At the apex of the hierarchy, the super admin assumes a pivotal role, wielding the authority to access and modify admin accounts, as well as its own credentials, thereby exerting control over the system's main administrative functions. On the other hand, admin users are endowed with the privilege of accessing both the repository of questions and the database of student users, enabling them to oversee and manage these critical components of the system. Meanwhile, students navigate a simplified pathway, beginning with the creation of their own accounts and subsequent login, culminating in the process of taking examinations and accessing their results. This description of data flow not only explains the system's operational structure but also underscores the whole user experience orchestrated by eTRAKTRAND, catering to the distinct needs and roles of stakeholders within the educational scenery.

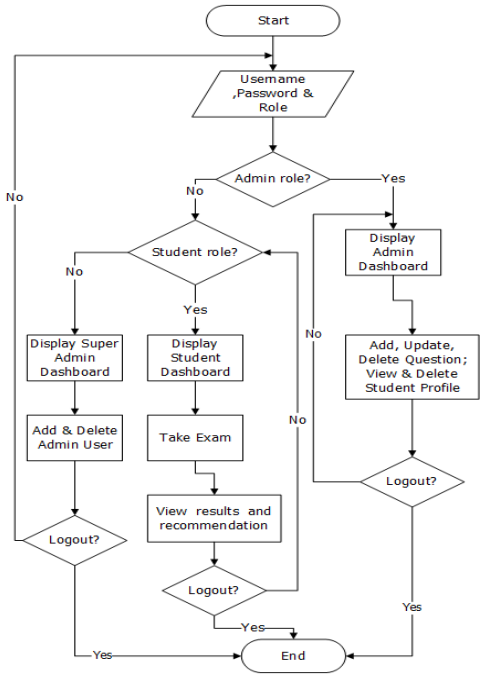


**Figure 6.** Flow Chart of the eTRAKTRAND.

Flowcharts serve as invaluable visual aids for describing the sequence of operations or actions within a system or process. As represented in Figure 6, the flowchart of eTRAKTRAND provides a comprehensive overview of the system's functionality, illustrating the movement of data from inputs to outputs. This visual representation elucidates how data flows within the system, highlighting the sources and destinations of data, as well as the mechanisms through which the system's database stores and processes this information. Specifically, the system facilitates various user interactions: student users can register, log in, take exams, and view results and recommendations, while admin users possess the capability to add, delete, update questions, and manage student profiles. Additionally, super admin users are capable with privileges to modify their own credentials and oversee the addition or deletion of admin users. By summarizing the details of system functionality in a visually intuitive manner, the flowchart offers invaluable guidance for stakeholders, facilitating comprehension and restructuring decision-making processes throughout the system's lifecycle. Figure 7 shows the Operational Framework for the Study is presented below.

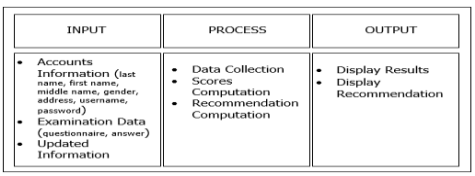


**Figure 7.** Theoretical Framework of the Study.

The Theoretical framework, outlining the fundamental principles and procedural steps involved in the inception and culmination of a project, serves as a cornerstone for clarity and efficacy. The project's success hinges upon the precise delineation of these protocols, elucidating the responsibilities and obligations of each participant involved. A well-defined framework is indispensable, as it underpins both the planning and execution phases of the project, ensuring cohesion and alignment with overarching objectives. Illustrated in Figure 7, a comprehensive depiction of the flow and fundamental functions involved provides invaluable guidance throughout the design and execution processes. This visual representation not only aids in navigating the intricacies of system development but also assumes a pivotal role in shaping the project's ultimate outcome. By adhering to the guidelines established within the operational framework, project stakeholders can navigate challenges, optimize resources, and foster synergy, thereby maximizing the likelihood of achieving project success.

**Sampling and Design Technique**

**Table 2**. Respondents

| Sample Size | Evaluators |
|---|---|
| 10 | Grade 10 Students |
| 1 | Guidance Office Staff |
| 1 | ICT Laboratory Personnel |
| 10 | IT Expert |

The table 3 provides a comprehensive overview of the participants involved in the testing and evaluation phase of the study. Specifically, the evaluation was conducted with the participation of a diverse group of respondents, consisting of the following roles: one (1) Guidance Office Staff, one (1) ICT Laboratory Personnel, ten (10) Grade 10 Students, and ten (10) IT Experts, totaling twenty-two (22) respondents. This diverse selection of participants ensured a holistic assessment of the eTRAKTRAND system, incorporating perspectives from various stakeholders with unique insights and expertise. By engaging individuals from different backgrounds and roles, the evaluation process aimed to capture a comprehensive range of feedback and insights, ultimately contributing to the refinement and improvement of the system.

**Results and Discussion**

In this chapter, it discuss how the capstone project and its overall goal were accomplished. (1) Developing an interface for the admin console, (2) developing an interface for the student console, and (3) developing an interface for the super admin console were the project's goals. The presentation of the results was constructed in accordance with the particular goals and discussions.

**Admin user add, delete, and update questions**

This section presents the process of an admin user adding, deleting and updating questions including the user interface and features of the system application. The figure 8 below showed the admin page and its functions.

As shown in the figure, the simple design displayed that the admin user can add, delete, and update questions for the exam. The red button in the right side is an indication were in the user can delete the questions. On the other hand, the green pencil button indicates that the user can edit or update the question.

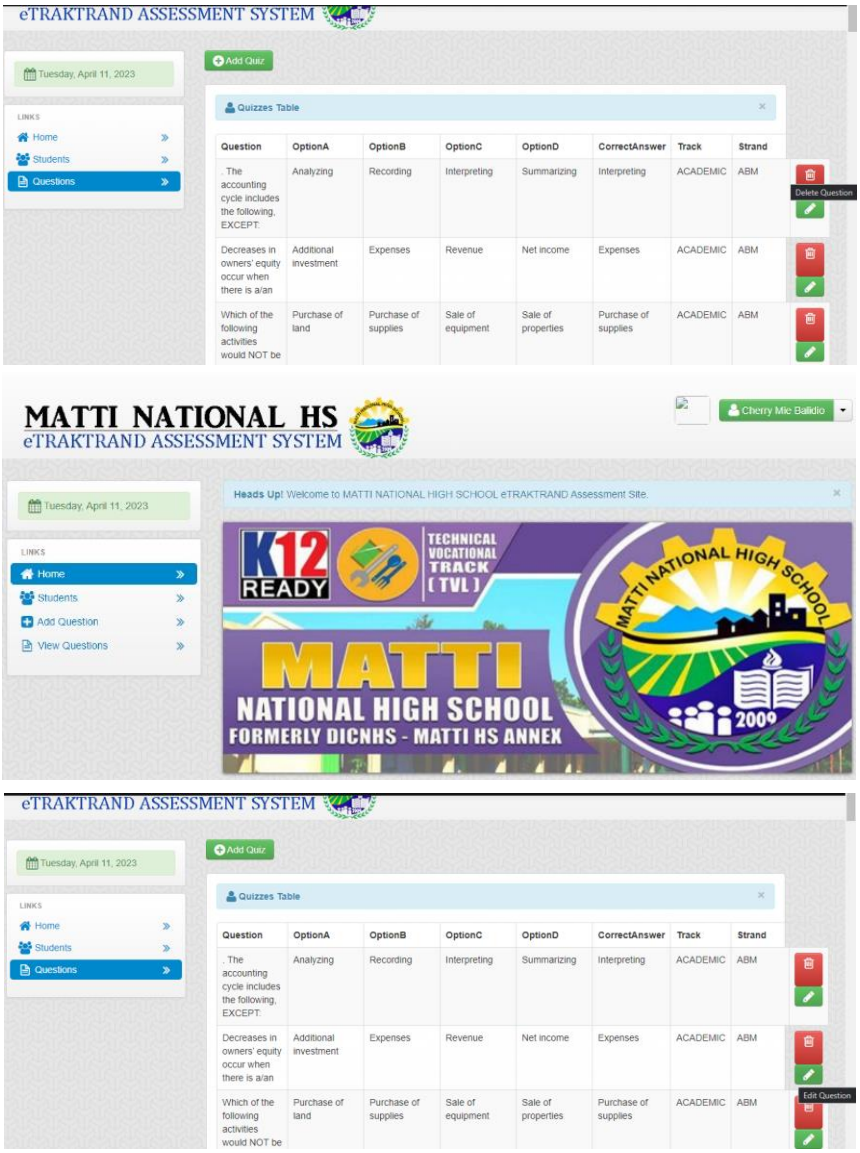


**Figure 8.** Add, Delete, and Update Questions

**Admin User View and Delete Students' Profile**

Developing an admin console with the capability to view and delete students' profiles entails designing a user interface that grants authorized administrators access to a list of student profiles, enabling them to select and delete one or more profiles as needed. As illustrated in Figure 9, the graphical user interface (GUI) exemplifies the process of deleting students' profiles by admin users. Within the interface, admin users can easily access and view the lists of student profiles, with the option to delete specific profiles highlighted by a prominently placed red button on the right side of the interface. This intuitive design feature serves as a clear indication of the delete function, enhancing user efficiency and minimizing the risk of inadvertent actions. Upon selecting the delete option, a confirmation message promptly appears, providing admin users with assurance and prompting them to confirm their intent before proceeding with the deletion process. This Graphic interface design not only enhances usability but also reinforces the system's overall efficiency and user-friendliness, ensuring a whole administrative experience for managing student profiles within the eTRAKTRAND system**.**

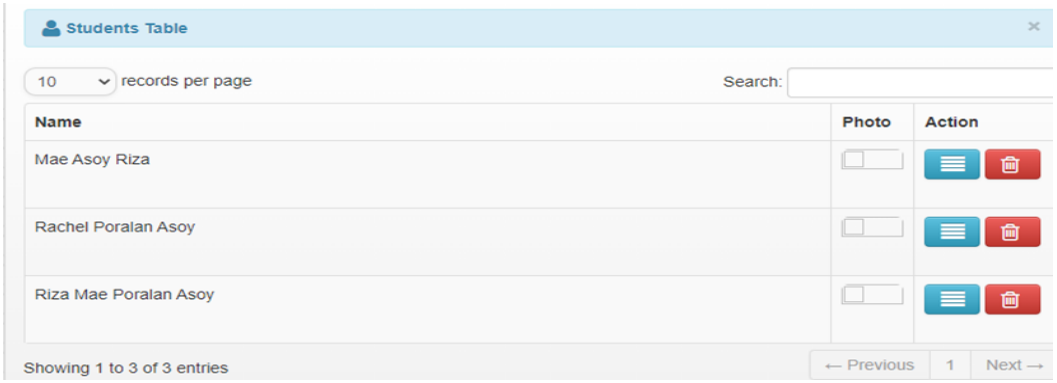


**Figure 9.** View and Delete Students' Profile.

**Sign Up: Creating Student Account**

The figure 10 shows the form in creating student Accounts. The form enabling student users to create their own accounts entails the development of both a user interface and a robust database system that facilitate the sign-up process and the storage of personal account information. The graphical user interface (GUI) showed in the figure below exemplifies the process of creating a student account, showcasing a design that prioritizes simplicity and user-friendliness. Within this interface, students are presented with a registration form where they can input their personal details, including their last name, first name, middle name, gender, address, phone number, as well as select a username and password of their choice. Behind the scenes, the database system securely stores the entered data, ensuring the confidentiality and integrity of students' personal information. By combining an in-built user interface with a database system, the eTRAKTRAND platform facilitates whole account creation for student users, enhancing their overall experience within the system.

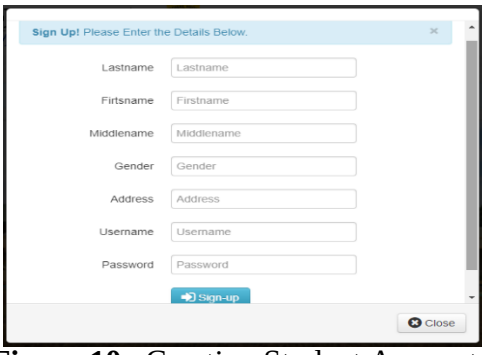


**Figure 10.** Creating Student Account.

**Student Take Exam and View Result**

Developing a student console capable of facilitating exams necessitates crafting a user interface that offers students an intuitive and user-friendly examination experience. As illustrated in Figure 11, the graphical user interface (GUI) exemplifies the process of students taking exams, showcasing a design characterized by simplicity and ease of use. The console is equipped with features that empower students to access and navigate through exam questions effortlessly, inputting their answers with ease and confidence. Additionally, students are provided with functionality to review and revise their answers before final submission. Once the examination is completed, students can submit their responses, concluding the exam-taking process. This streamlined interface design ensures that students can focus on the examination content without unnecessary distractions, thereby enhancing their overall examination experience. By prioritizing user-centric design principles, the eTRAKTRAND platform facilitates a whole and efficient examination process for student users, fostering a conducive environment for academic success.

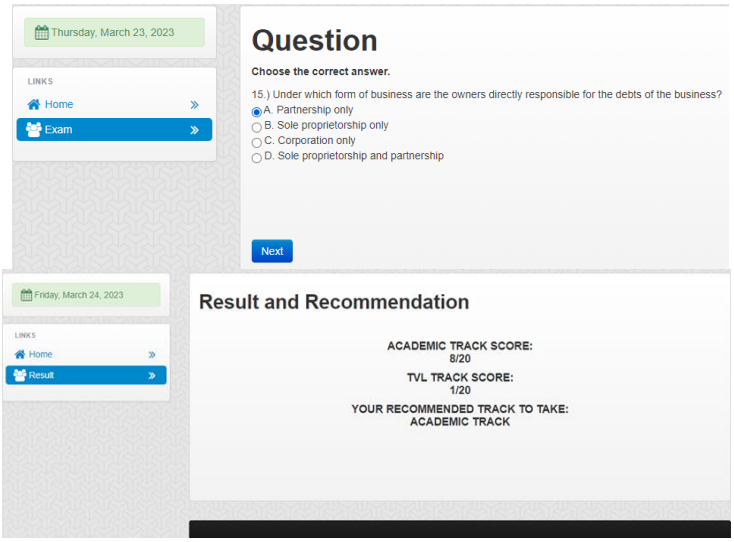


**Figure 11.** GUI of the Schedule for Appointment.

**Add and Delete Admin User from Super Admin Console**

The process of managing admin users within a super admin console involves the distribution or removal of administrative privileges by a designated super admin user. As showed in Figure 12, the interface design demonstrates simplicity and clarity, facilitating whole navigation through the system's functionalities. The user-friendly display empowers the super admin to effortlessly perform tasks such as adding new admin users, accessing comprehensive lists of existing administrators, and removing specific admin accounts. Upon selection, a confirmation message promptly appears, providing assurance to the super admin that their action is deliberate and irreversible. This graphic interface design enhances user efficiency and confidence, ensuring that administrative tasks can be executed with precision and ease. Through intuitive design features and clear visual cues, the eTRAKTRAND platform empowers super admin users to effectively manage administrative roles, contributing to the overall efficiency and functionality of the system.




**Figure 12.** Add and Delete Admin User from Super Admin Console.

**Table 3.** Overall descriptive ratings, in terms of functionality, reliability, Usability.

| Particulars | Mean | REMARKS |
|---|---|---|
| Functionality | 4.36 | Good |
| Reliability | 4.5 | Good |
| Usability | 4.6 | Excellent |
| Average | 4.5 | Good |

**Overall ratings from the respondents in terms Functionality, reliability, usability.**

According to the findings presented in Table 3, the mean ratings for the functionality, reliability, and usability of the eTRAKTRAND: A Decision Support System for Grade School Student Track and Strand Online Examination web-based application suggest that evaluators perceived the application to be moderately effective. Specifically, the application received a mean functionality score of 4.36 out of 5, indicating that it adequately fulfills its intended functions in a respective and efficient manner. Furthermore, the app demonstrated reliability, as evidenced by a mean score of 4.5, signifying users' agreement regarding its trustworthiness and consistency. Moreover, with a mean usability

score of 4.6 out of 5, the application was deemed effectively useful to users. However, there remains room for improvement, as the assessors assigned a lower grade than expected, highlighting areas for enhancing the user experience. Notably, Alavi, M., and Leidner, D. E. (2001), underscore the importance of assessing the system's usability, dependability, and usefulness, while Lee and Koubek (2017) suggest that these findings could inform future studies and aid developers in enhancing the application's functionality, efficacy, and usefulness for users.

## Conclusion

The conclusion drawn from the evaluation where the system demonstrates competence in various administrative and user-related functions. Specifically, it showcases the ability to add and delete specific admin profiles, manage questionnaires by adding, deleting, and updating questions, as well as view student profiles and manage student accounts. Furthermore, the system facilitates the registration and creation of student accounts, allows users to log in as examinees, take exams, and access generated results and recommendations. These functionalities collectively underscore the system's potential to streamline academic processes, empowering students to efficiently manage their accounts, participate in exams, and access pertinent information. Additionally, the system extends its utility to teachers and faculty by enabling them to oversee questionnaire management tasks such as modifying questions and managing admin and student accounts. Notably, the successful implementation of the system has yielded tangible benefits, aiding students in informed decision-making processes and enhancing overall academic efficiency. to understand how technology can be useful to the students in their studies and, teachers in their teaching career.

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