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# EffiESGen: A User-centric Web Application for Efficient Exam Scheduling and Collaboration in Education

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**Abstract**

The EffiESGen web application is a new huge step regarding the using of new technology on and for education, stimuli of the aggressive creation of examination schedules and improved cooperation among the representatives of the educational sector. Built with a user-oriented design principle, EffiESGen manages to respond to the multifaceted issues that are characteristic of the conventional exam timetabling. The features employed in the application utilize advanced formulations that help in processing scheduling information for uniformity and resource allocation. EffiESGen gives administrators a system where they can easily post and share exam timetables, at the same time offer students a system where they can retrieve and download their own specific exam timetables. The benefits of using collaborative tools like messaging and file sharing are the added ability to have an easy communication between the students, instructors and administrators in making the process of scheduling exams more collaborative and less of a hassle. This paper aims at describing the process of creation of EffiESGen, stating the major characteristics and positive impact which it can bring to the institution in terms of exam management. Using empirical studies and various users' views, EffiESGen's real-life application and effectiveness is described, proving its purpose of enriching everyone's learner-centered process.



*Keywords:* Educational Technology; Exam Scheduling; User-Centric Design; Collaborative Tools; Web Application Development.

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## 1. Introduction

Organizational management of examinations in current highly competitive educational environment along with efficient building of cooperation between students and teachers are crucial for the success in the examination process. Examination timetabling deployed by manual approaches is several times ineffective, creates clashes and logistical tasks. In order to overcome these challenges, this paper introduces EffiESGen – a web application aimed at improving the usage of scheduling services by focusing on users' needs and fostering collaboration in the scope of education institutions.

EffiESGen deals with the successful use of information technology in arranging examinations, with the vision of making the process smooth and efficient for all key players. EffiESGen incorporates the intelligent algorithm, ease of user interface, and collaboration to enable administrators, instructors, and students for effective and fair examination management.

The objective of this work is to describe the functions and positive effects of EffiESGen with focus on the user orientation and the application's exceptionality in changing the organization and conduct of exams. We explore the execution algorithms on which the applications' scheduler is based, but also the tools for group, student-to-student and student-to-teacher interaction. Moreover, we present real-life scenarios and users' experience to explain how EffiESGen has been successfully applied in schools and other educational establishments.

The key aims of this article are to introduce the main features of EffiESGen, demonstrate how it helps to improve efficiency and equity of timetabling in examinations, and reveal user experience and feedback of the educational organizations using this novel web application. In this endeavor, our hope is to show how the use of EffiESGen can help lessen the concerns that come with the conventional method of exam scheduling and enhance the learning environment through students collaboration.

Finally, EffiESGen is a brand-new pattern of exam scheduling that aims to help the administrators, instructors, and students comprehensively through proactively using the solution. Educational institutions can therefore benefit from adopting this user-centric web application in transforming their current exam scheduling to fit in the digital enablement of examinations to the ultimate improvement of examinations in the contemporary society.

## 2. Background

A web application that will assist in organizing exams and enable the cooperation of students and faculty can change the way exams are scheduled and advance the teamwork of faculty members and students. Conventional exam timetabling techniques were done by hand increase conflicts and increase time while adding to the administrative work [1]. Such an application can enable the objectives to be attained wherein administrators, instructors, and students are provided with seamless control for managing exams with fairness and transparency by leveraging intelligent algorithms, user interface, and collaborative features of technology-enhanced applications [2][8].

The behavior-focused web application that is similar to the presented concept of exam scheduling is EffiESGen which has a common goal of efficiently scheduling exams and improving cooperation in education facilities. The application has the algorithm integrated into the required fields, which enables internal students' and instructors' communication, collaboration, and feedback on each other's work [3].

The application of EffiESGen in educational institution and other establishments and the response of its users are also demonstrated here in real-life experiences [4]. User-centred design (UCD) has been described as a process that involves users' requirement understanding right from the earliest stages of design [2][5][10].

This idea is about organizing examinations and cooperation; thus, following the principles of user-centered design, UCD can assist in constructing an effective, adequate, and enjoyable use of examination scheduling for administrators, instructors, and students [7].

### *2.1. Importance of User-Centered Design*

Therefore, user-centered design (UCD) is the design approach that takes into consideration the users' needs, wants and expectations at every step of the process. When it comes to examining the experience in the context of scheduling exams and cooperating with other students as well as instructors and members of the administration, UCD may

elucidate a means of providing a positive user experience that will meet and satisfy the needs of all the involved parties. In particular, this approach allows providing the user with a web application that meets his/her concrete needs and wanted functions, thus increasing the rate of application usage and the effectiveness of the final result [1].

### *2.2. Challenges in Traditional Exam Scheduling*

Traditional methods for exam scheduling were and often are more time-consuming and may cause conflicts as well as lead to the administrative load. There are some negative effects of educational challenges that can affect the students, instructors, and administrators in the institution. For instance, it may prove extremely challenging for students to organize their time in such a way that they have to sit examinations simultaneously resulting in poor performances due to stress. In the same regard, doing the scheduling manually may involve a lot of human interface and can be subject to producing several complications and eventual inefficiencies. students interact in a learning game [1][6][9].

### *2.3. Purpose of EffiESGen*

EffiESGen is a web-based application particularly developed through user-oriented approach with the aim of increasing efficiency of exam scheduling and collaboration among users operating in the field of education. Its objective is when preparing tests, it eases the process through a platform where educations inputs relevant data & time, and date, the app then formulates a schedule bearing in mind events and resources available. Moreover, the EffiESGen also has incorporated some features for user sharing, so educators or instructors are able to cooperate on the materials and different tasks that can improve the overall performance and increase the speed of the work. Despite its simplicity and effectiveness of the utilized functions, and the EffiESGen will be useful for any educational institution focusing on exam scheduling and collaboration between educators or instructors.

### *2.4. Benefits of Technology in Exam Scheduling and Collaboration*

With the help of technology and intelligent algorithms, user-friendly interfaces, and collaborative features, user-centric web applications can overcome the prospects pertaining to the traditional examination scheduling approaches. These applications can also help in the scheduling process by avoiding conflicts and minimizing errors that might be made by administrators as it also saves time and resources. Moreover, collaborative features can also help students and instructors to engage, organize, and share ideas and feedback, thus improving the learning process [9].

For instance, EffiESGen is a user-oriented web-based application designed to facilitate the task of creating exams and improve communication in the educational context. The application involves basic algorithms and collaborative tools to enhance student-student and student-instructor interaction and feedback. Real-life examples and users' experience reveal that EffiESGen is an effective tool for improving efficiency and effectiveness of educational organizations [1][6].

All in all, the presented user-oriented web tools for effective exam timetabling and cooperation in educational settings may become a breakthrough in the creation of more effective exam timetables and improve cooperation between students and educators or instructors. As user-centered design and technology, these applications can complement the various difficulties and inconveniences that come with the traditional examination timetable, enhancing the learning experience for every stakeholder.

## 3. Method

The study utilized the Agile methodology, specifically implementing the Scrum framework with key roles and practices in place. This included a Scrum Master, Product Owner, and development team, as well as various practices such as sprint planning, daily stand-ups, sprint review, and retrospective meetings. Scrum artifacts like the product backlog, sprint backlog, and burndown charts were utilized to monitor progress and prioritize tasks effectively [11][12][13][14].

The research itself consisted of six main components, with each progressing from start to finish. These components included a login system, basic home page viewing, timetable data viewing, student administration, invigilator management, and overlapping checking. Participants were given the flexibility to discontinue at any point and skip survey questions they did not wish to answer.

To gather necessary data and requirements, interviews were conducted with the Exam Unit, and questionnaires were completed by both students and invigilators. These methods were crucial in ensuring all relevant information was obtained to successfully carry out the research.

## 4. EffiESGen Development

The initial phase of EffiESGen's development began with a thorough definition of the problem statements faced by the end-users, coupled with the articulation of the project's objectives. This phase also delineated the project scope, tailored to the specific needs of the target user demographic. Collaborative meetings with users were instrumental in identifying their current challenges and in discussions to determine the optimal features that would enhance user experience and the desired graphic design for the web application, with an emphasis on clarity and ease of use.

Following the problem definition and objective setting, the design phase was initiated. This phase was dedicated to conceptualizing a unique and user-appropriate design for EffiESGen. It involved the creation of sketches for each component of the application before development, encompassing key interfaces such as the Home, Session, Timetable, Timetable subject data, Login page, Student page, Invigilator page, and Popup displaying overlapping students. A consistent and uniform design was applied across all interfaces to prevent user confusion.

The problem statement, objectives, and design sketches were translated from the development phase into a working application. Phase 2 was involved as setting up the base lines of important features from user login to session, timetable management features. Student and Invigilator pages built for imported data into the system from Excel files. The architecture of the tool was using a React JS front-end with PHP at the back end and MySQL for the storage and management of the data which ensured all data displayed is correct and trustworthy as well. EffiESGen underwent a rigorous test phase to ensure development was aligned with desired functionalities and needs. This phase consisted of assessing the errors, look and the user experience of all the features that were developed. This application was fed in predefined lists and filtered by unit and flow test. After successful testing, EffiESGen was in beta testing for users, and if any bug is found, it is fixed and again tested to keep a smooth experience to the users.

During release, we deployed EffiESGen in production, publicly accessible and deployed on its own server inside an accessible network. EffiESGen was a web-based application, offered through a specific URL accessible using modern browsers. Post-deployment, EffiESGen entered a feedback and evaluation phase, where users interacted with the application for the first time. Valuable insights were gathered through interviews and questionnaires, with the Exam Unit as the primary interview subject and students and invigilators participating in the questionnaires. The collated feedback was analyzed to inform further improvements and enhancements to the EffiESGen web application. Fig. 1 shows the examples of user requirement analysis for data gathering and requirement.

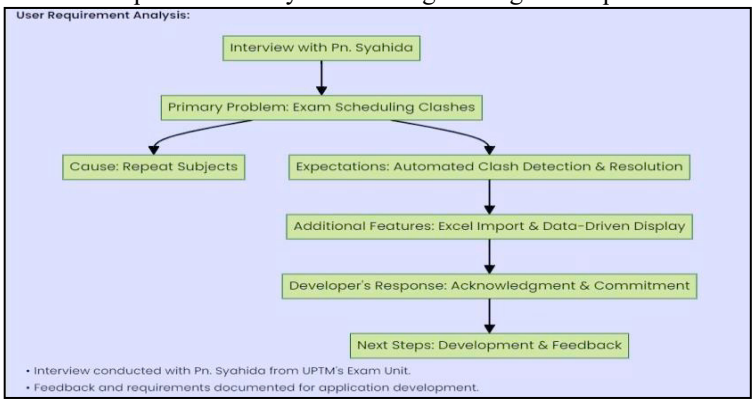


Fig. 1. User Requirement Analysis.

### *4.1. Features of EffiESGen*

The EffiESGen is a user-centric web application that provides efficient exam scheduling and collaboration in education. With its user interface, this application simplifies the complex process of exam scheduling, making it easier for both students and teachers to organize exams. The EffiESGen is equipped with a variety of features that enhance its functionality, including automatic, real-time updates, collaboration tools. The automatic scheduling feature allows the application to create an optimized exam timetable based on a range of factors, student and educators or instructors availability, course load, and timing constraints [8]. Real-time updates ensure that the timetable is always up-date keeping everyone informed of any changes. The collaboration tools ensure seamless communication between students and educators or instructors, enabling them to share updates, feedback, and any other important information in real-time. These features make the EffiESGen an essential tool for any educational institution looking to streamline exam scheduling process as below:

- Exam Scheduling
  An important task in universities is the scheduling the exams that need to be written, since the students should not receive an overproportion of exams at the same time. The schedules that school administrators traditionally create manually keyword emphasize are a time-consuming and painstaking process that frequently leads to errors and confusion. The Schedulizer is a human-centered web-application that solves this problem by replacing this one-size-fits-all process with an exam-scheduling platform that uniquely takes the perspective of the student humanitarian by allowing students to stress and dedicate more time to certain exams than to others. A fully customizable exam schedule portal, the EffiESGen is a game-changer in EdTech that allows university educators to automate the allocation of exam dates and publishes simple, accessible versions of exam schedules for students easily reducing the amount of time and improved communication between students and instructors needed for exam scheduling. Fig. 2 shows the Exam Scheduling feature.

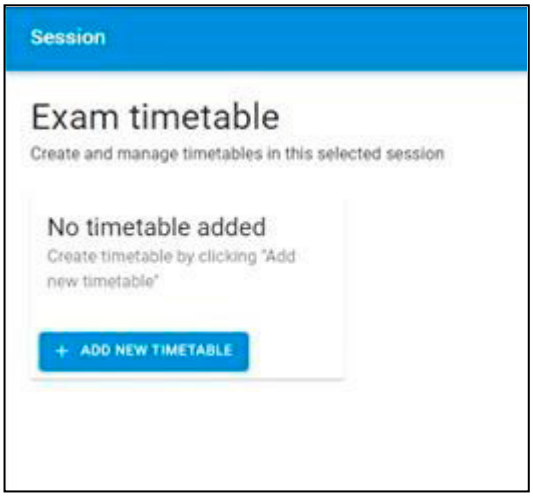


Fig. 2. Exam Scheduling feature.

- Creating Exam Schedules
  Creating exam schedules can be difficult for educators or instructors, and university administrations. For people who have a limited amount of time and an ever-increasing workload, it can be hard to give each of them a work schedule that takes into consideration their faculty, as well as their course and administrative duties. Moreover, sharing information is not a bad idea given the fact that it helps everyone have the information needed to come up with the most suitable and informed decisions on time of scheduling. EffiESGen is a user-friendly web application that generates exam schedules in a smart way based on a simple input (selection of subjects) by educators to help their students. Schools can save time and resources, and improve the quality of their exam

scheduling by working together and making use of powerful algorithms. Fig. 3 shows the Creating Exam Schedules feature.

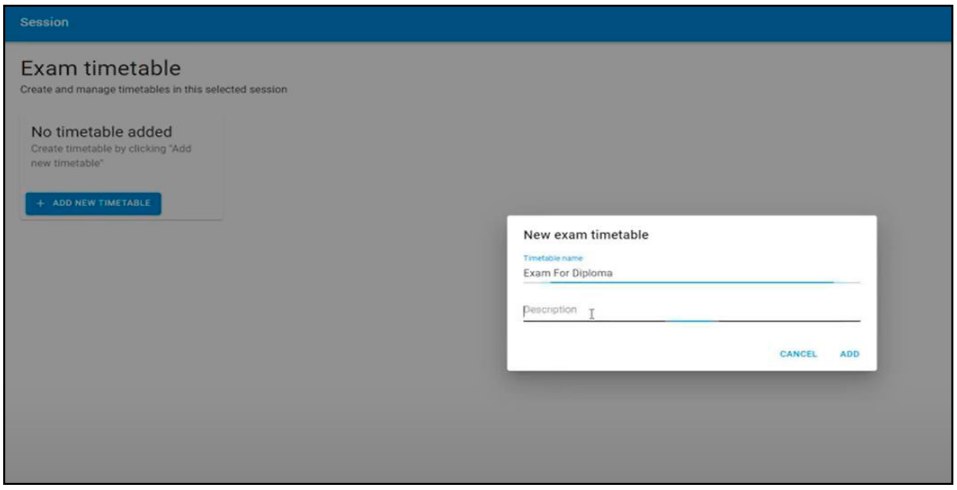


Fig. 3. Creating Exam Schedules feature.

- Editing Exam Schedules

  Exam Editing exam is a part of the EffiESGen web application. This feature provides users with the ability to necessary changes and modifications to their exam schedules. For instance, a class is cancelled or rescheduled, users can easily edit schedules by selecting the affected exams and making the necessary adjustments. The editing feature also allows users to add or delete exams, change durations, and update exam venues. Furthermore, this feature fosters collaboration among users as it enables them to view and modify the schedules of other users a user-friendly way. Overall, the editing feature ensures that exam schedules remain up-to-date and relevant users' needs. Fig. 4 shows the Editing Exam Schedules feature.

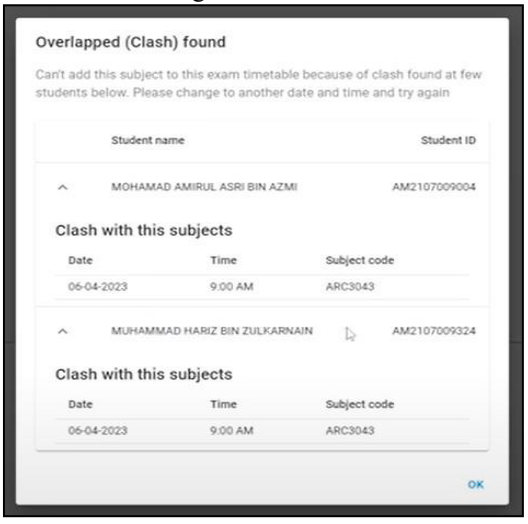


Fig. 4. Editing Exam Schedules feature.

- Viewing Exam Schedules

  The Exam Schedule web application provides a user-centric approach to efficient exam scheduling and in education. One essential feature of the application is the ability to view exam schedules. With the viewing exam schedules feature, students and can easily access their exam schedules and view them in a clear and concise manner. feature allows for better organization and preparation for exams, reducing stress anxiety. The exam schedules can be easily customized based on the user's preferences, and any changes made to schedule are reflected in real. This feature also enables students and professors to collaborate and communicate

effectively, ensuring that everyone is on the same page regarding exam. With the EffiESGen, viewing exam schedules has never been easier, efficient, and hassle-free. Fig. 5 shows the Viewing Exam Schedules feature.

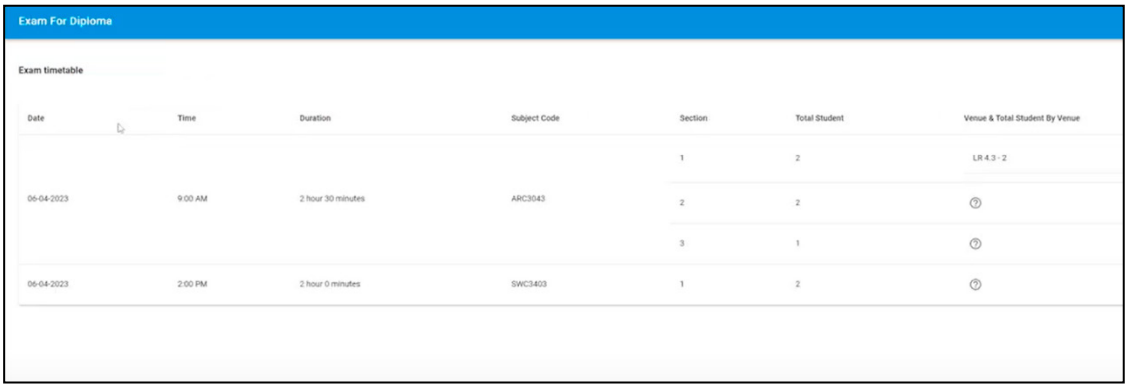


Fig. 5. Viewing Exam Schedules feature.

- Collaboration
  Collaboration is key the success of the EffiESGen web application. By allowing multiple users to collaborate on scheduling, this tool streamlines communication and eliminates scheduling conflicts. With just a few clicks, users can input their availability and exam times making the scheduling process more efficient and user-centric. Additionally, the application allows for real-time collaboration, so can quickly and update their availability or preferences as needed. The EffiESGen also considers various factors when scheduling, such as room availability and student schedules. Collaborating through this web application is a game-changer for education, making exam more efficient and streamlined than before. Fig. 6 shows the Collaboration feature.

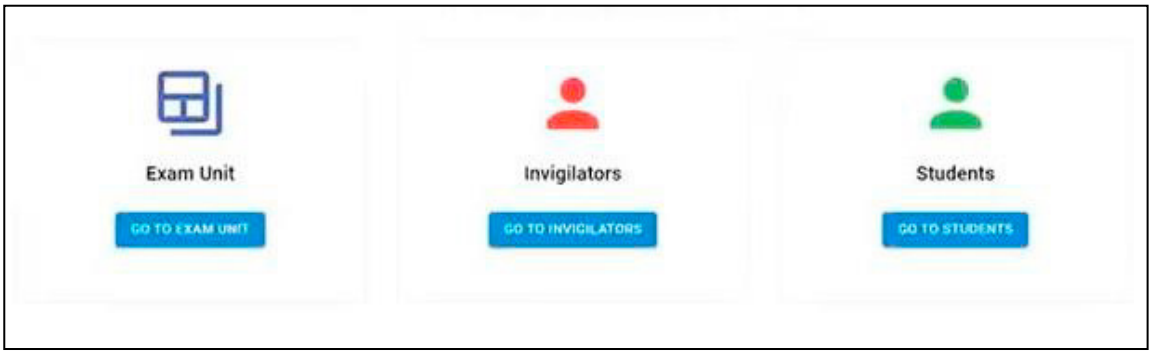


Fig. 6. Collaboration feature.

- Inviting Collaborator
  Inviting collaborators to join EffiESGen is an essential feature of the web application. It allows users to invite educators, administrators, or students to collaborate on exam scheduling. By inviting collaborators to join the web application, users can efficiently divide among team members and ensure that everyone is up-to-date on the exam schedule. web application users to send invitations via, which includes a link to join the group. Invited can also view and add comments to the exam schedule, making collaboration seamless. Additionally, can manage the permissions of their collaborators, controlling who can edit and delete exams. The inviting collaborator feature in Exam Schedule emphasizes user-centric design, encouraging smooth collaboration among team members for efficient exam.

### *4.2. How EffiESGen Works*

The EffiESGen is an innovative, user-centric web application designed to streamline exam scheduling within educational institutions. It offers a comprehensive platform that enables administrators to efficiently upload and manage exam schedules, while concurrently allowing students to access and download their personalized schedules.

The application's functionality commences with the administrator's upload of essential data, encompassing schedules, classroom allocations, and instructor details. Subsequently, the system employs sophisticated algorithms to analyze the uploaded information, with the objective of generating an optimized exam schedule that significantly reduces conflicts and optimizes the utilization of available resources. Upon the generation of the schedule, students are granted the ability to conveniently view and download their tailored exam schedules, which are organized according to their specific courses and sections. Furthermore, EffiESGen incorporates collaborative tools, such as messaging and file sharing capabilities, to enhance communication between students and instructors. These features facilitate a collaborative environment that is conducive to the planning and execution of a seamless and successful exam period.

## 5. Discussion

The herein presented EffiESGen web application for the enhancement of educational practices, such as exam scheduling and collaboration, underlines that UCD methodology is crucial for enhancing those practices, as the utility has been designed to meet the users' needs and enhance their learning experience. UCD involves users right from the design stage, which means that the final product meets user's requirement, expectation and preference hence enhancing the satisfaction levels and effective usage of the application.

Traditional approaches in examination timetabling entail planning that require a lot of time with low chances of avoiding clashes and incurring errors. The above challenges are effectively solved by EffiESGen as it auto generates the schedules for the exams as well as helps in avoiding any clash while at the same time helping the administrators in the process. It also helps in minimizing working hours thus enhancing efficiency in the educational institutions for the predetermined administration.

The main reason behind EffiESGen is to reduce the examination timetabling issues and at the same time the collaboration between the educational users is also improved by virtue of educators filling inputs and getting optimized timetable. It includes group functionalities that enhance interaction between students and trainers/coaches which increases the efficiency of the work.

The process used in creating EffiESGen follows the Agile methodology which stresses on the development in cycle and the feedback from the user. Through the consistent process of splitting and rearranging the components of the project according to the organization's needs and other requirements, Agile enhances the development process to create applications that meet the user's needs better.

EffiESGen provides the user with several options concerning the exams: creation of the exam, editing, putting the exam to the timetable, viewing the timetable, collaboration, and invitation of the collaborators. These functionalities help in simplifying the process of scheduling for the exam and also in fostering the best environment for learning transformations.

Overall, EffiESGen represents a significant advancement in e-learning and has the potential to revolutionize exam scheduling and collaboration in educational settings. Future research should focus on user experience, testing in different educational environments, integration with other educational technology tools, and evaluating its impact on student performance to ensure its continued success and effectiveness within the education sector. By addressing these research areas, EffiESGen can further evolve and make a lasting impact on educational practices.

## 6. Conclusion

The development and application of EffiESGen web app is a significant step in the evolution of educational technology especially on exams scheduling and collaboration. Applying user-centered design principles and taking advantage of advanced technological tools have enabled EffiESGen to overcome various problems associated with conventional examination scheduling approaches. Through automation of scheduling process, conflicts minimization, and improved communication among stakeholders, EffiESGen has not only made the administrative tasks easier but it has also contributed towards a more positive and productive educational experience.

Adoption of the Agile methodology during the development process for EffiESGen has emerged as a major determinant of its success. This iterative approach emphasizes user feedback and flexibility ensuring that the application constantly adapts to suit emerging user requirements. The outcome is thus a dynamic friendly platform for

both administrators who manage exam schedules and students accessing their own schedules which are easy to understand since they are personalized.

Moreover, the collaborative features embedded within EffiESGen have facilitated a new level of interaction and coordination among students, instructors, and administrators. These features have transformed the way educational institutions approach exam scheduling, making it a more collaborative and less burdensome task.

In conclusion, EffiESGen stands as a testament to the power of user-centric design and technological innovation in revolutionizing educational processes. Its impact on exam scheduling and collaboration within educational institutions is a clear indicator of the direction in which educational technology is headed. As the educational landscape continues to evolve, applications like EffiESGen will play an increasingly vital role in shaping the future of learning and administration.

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