College of Engineering and Information Technology

Information Technology Department

**Development and Evaluation of**

**AXION**

**A Web-Based Task Management Tool for Students**

For RESEARCH 1 – Methods in Research Computing

For the Degree of Bachelor of Science in Information Technology

November 6, 2021

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**CHAPTER 1**

**BACKGROUND OF THE STUDY**

A task is an objective that can be attained by putting effort into it. Whereas, the term ‘organizing’, is defined as a process that starts the implementation of plans by defining roles, establishing working relationships, and efficiently allocating resources to achieve the indicated and intended outcomes or goals. Moreover, task management is the practice of overseeing a task's progress throughout its life cycle, from planning to testing to tracking to reporting.

Since the start of the pandemic, students are engaged in studying and have plans to work on. They usually manage their tasks on their devices through different ways, like setting a reminder manually, writing it in a piece of paper, or even starting with tasks with the highest priorities or the closest to the due date. In other words, students have their own methods to effectively handle the tasks that they ought to undergo. It was also found out that, according to Adams (2019), the students’ perceived control of time was the factor that correlated significantly with cumulative point grade average. Together with the current situation amidst the pandemic, the students are spending most of their time isolated and stuck with using technology as an alternative for learning, where they are to rely on managing their tasks through management tools more often.

However, with new tasks piling up against other ongoing tasks, students may get overwhelmed and conflicted in time submissions, leading to difficulties in their ability to handle tasks, whether these are being made individually or through groupings. With this, it shows that students may lack task-managing skills, which may also cause their work to have slow progression and to be delayed as a result. In addition, these could clash along with other competing demands, such as non-academic activities, that may affect their attempts in pursuing their academic tasks. These can make the students feel crucial when making decisions on which tasks should be prioritized first and which is set aside. A task with no deadline being set may highly result in rushing it nearly before its due date. As discussed by Milano (2021), Information overloading can also be a factor since it is when individuals are expected to utilize different platforms, answer phone calls, read written memos and reports, respond to messages and emails, watch videos, and many more wherein the information might be too much, causing one’s mind to be foggy. These problems would majorly cause the students to handle tasks in a messy, improper manner and may negatively affect their academic performance and well-being.

To address the problems mentioned above, this study aims to develop a web-based application that has functions according to what the students mostly desire to see and experience for their tasks and schedules. Axion will be mainly about making tasks in various workspaces for different subjects. The structure would be similar to a Kanban board, and the design being similar to other web applications, like Trello and Height. The researchers will develop the web application’s user interface as simple as possible, yet powerful which would aid in certain struggles, including information overload, when working on one or even two or more tasks at the same time. The students should have a smooth experience on using it. Axion will have a feature that encourages students to take notes of their tasks as soon as possible and to be active about it in order for them to be more efficient, to enhance their management skills, to ensure their performance, and to prevent future problems when dealing with tasks, such as procrastination. Besides that, in terms of tasks with no deadlines, the application does not require putting a deadline, but it will highly suggest to the user to put one in case it will trigger procrastination. The researchers will put brief, comprehensible instructions and other textual forms so that it will not tag along with information overload. In addition, the implementation of login authentication will be added. For this feature to be fully functional, the researchers will use an online database where the credentials and other data of the students will be stored, such as student numbers, passwords, contacts, and such. This will be open to all students. If a user tries to use brute force or has failed to access the application, it will set off an alarm and will be treated as a possible threat, whether the user is a student or not. By developing the web application, the said solutions should be able to benefit its users and to make a positive output and performance to their own tasks and projects. To develop such a web application, the researchers will be using the following software: Adobe Photoshop CS6 for the graphics and UI elements of the web application, Webstorm for the coding environment of the web application, SvelteKit, which uses Svelte for testing and debugging of the system, MongoDB Atlas for the application’s online database for the records of student numbers in the university’s database and other data. The end result of this development process will be available to be used with a browser capable of handling high-end web applications.

**STATEMENT OF THE PROBLEM**

This study focuses on the current problems that a student might face regarding their management on their academic-related tasks, since the students are currently working on blended learning as an alternative to continue their education amidst pandemic, thus their sense of independence is being challenged and this includes managing their own time and resources. Certain management struggles that every student might face along the way are: (1) poor management skills, which can trigger more struggles, (2) too much workload that it could overwhelm and pressure the students, (3) the conjunction of academic and non-academic activities, thus making decisions will become crucial, (4) uncertainty and procrastination, and (5) information overload. Such factors can negatively affect every students' efficiency and well-being, including their academic performance, and may even lead to unpleasant results, such as internal chaos and demotivation.

**GENERAL OBJECTIVE**

The researchers strive to make Axion capable for students. This can be done by defining the underlying management problems of the students, specifically evaluating and developing a task management tool for students to manage their academic tasks properly.

**SPECIFIC OBJECTIVE**

To identify and assess the correlation of factors or variables that are included in this study, such as the students’ standing, practices, and struggles toward the area of management, and to have sufficient foundation of knowledge and data gathered from the factors or variables. It will be used as a requirement for the researchers to methodically evaluate, develop, and design a web-based task management tool that is capable enough to support students with overcoming their relevant obstacles, manage their academic-related tasks efficiently, and improve their academic performance.

**PURPOSE AND DESCRIPTION**

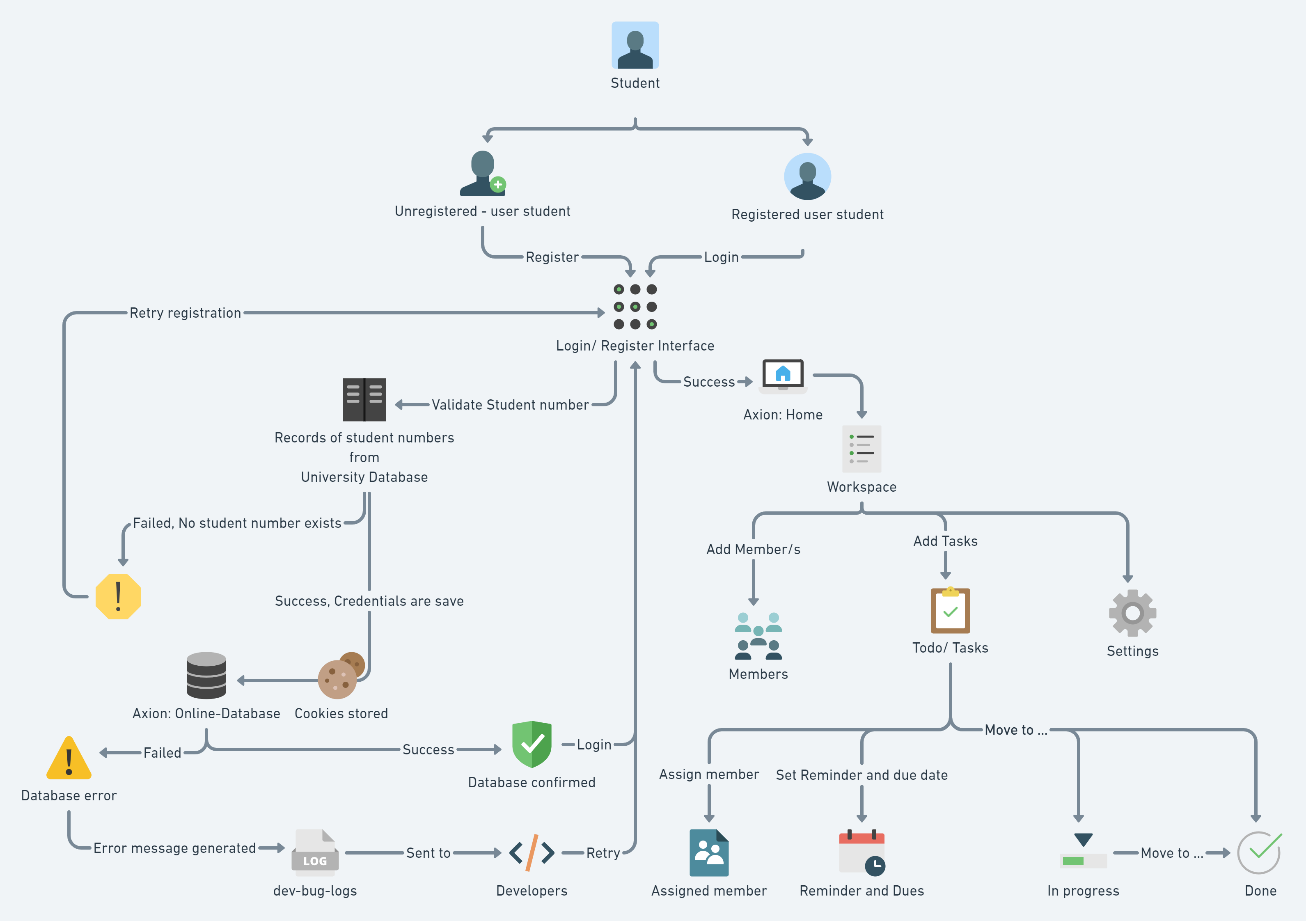
This study broadly shows the purpose of Axion in helping students to successfully organize their academic-related tasks as these tasks would be able to go along well with their daily lifestyle. Due to this, students can produce sufficient performance to their work, exerting their potential to become more productive, which can result in achieving academic success and enhancing their well-being. This study and Axion,can also be a source of information that future researchers can use to support their own studies.

**SCOPE AND LIMITATION**

Axion aims to cover the students in general as the scope. The researchers are able to understand the participants since they are also in the same status and circumstances as them. As for the limitations, the web application will have limited access if and only if the internet connection being used will also be limited. In other words, internet connection is essential for the web application to work. Not to mention that students may even be unable to have an internet connection, let alone access the web application. Another limitation is that the application may not satisfy some of the students’ interests or it may not be compatible with them. Still, it aims to be uniformly acceptable. Lastly, the advantages of the web application will not be guaranteed to offer absolute solutions that will answer every problem there is for the students' task management skills, for it only serves to aid them regularly.

**CONCEPTUAL FRAMEWORK (Web application’s system)**

The following diagram describes the flow and process of the web application in different user-students state, the diagram is presented below.

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The diagram starts at the ‘student’ located at the very top part, wherein he/she is either registered or unregistered to Axion. Unregistered users-students must register first in the web application and validate their credentials. If the credentials exist in the records within the university’s database, the credentials will then be saved and stored into Axion’s online database. Failure to find the credentials will lead to the registration being cancelled and the web application will attempt to register the users-students again. If it returns with an error, the web application will handle it by sending a message or logs to the developer, in order for it to be fixed on the next patch. The web application should move back to the login screen. For the registered users-students, after logging in, they will automatically have one workspace where they can add or create to-do notes or tasks, with the workspaces being similar to projects. Registered users-students are unable to register another account if they have one existing. They can add members to their own workspaces, and access the settings and other features of the web application. With the tasks being created, registered users-students can assign members on tasks. They are able to set a reminder and due date and time in the built-in calendar, and move tasks into the ‘in-progress’ board, which will then move to the ‘completed’ or ‘done’ board once a task has been completed. For some instances, if the users-students have wrongly provided their credentials three times and failed to log in because of a wrong password or is unable to find their credentials, the web application will refresh the login interface to let the users-students retry logging in their correct credentials.

**SIGNIFICANCE OF THE STUDY**

The result of the study will be a great benefit to the students in general. This study can be a learning paradigm on: (1) how students can perform better at managing their tasks, workflows in academic and non-academic tasks, and better grades or academic performance, (2) to also avoid the most problematic hindrances when managing tasks, such as procrastination and demotivation, and (3) to help improve the students' academic competence and develop their managing skills on their own, which will aid them on managing their work resources in the future once they will be employed.

**DEFINITION OF TERMS**

**Kanban -** is a visual board or system originating from Japan that helps with schedules and track tasks as it moves through a process.

**Organizing** - is one of the most important functions of management since it focuses on efficiently allocating and organizing people and other financial resources to carry out the organization's strategies. It also includes developing, maintaining, and managing working relationships, which requires planning and a variety of methods for completing those tasks.

**Planning** - The primary job of management is planning. It is a blueprint for the activities that will be carried out to achieve set objectives in the future. It entails planning forward and laying out a strategy for the future.

**Productivity -** is the capability of one or more individuals to produce goods and services efficiently.

**Productivity Management Software (PMS) -** are programs designed to help individuals manage tasks and achieve productivity.

**Project -** is a series of related tasks that is carefully planned by an individual or a group of people to achieve a certain objective.

**Task** - A task is a single work unit — one stage in a multi-phase project. A task must be completed by a specific deadline and contribute to the achievement of work-related goals.

**Task Management** - is a process in which a person or a group of people keeps track of a task throughout its life cycle and makes choices based on the results. Task management is accomplished by the use of software solutions that assist in the successful organization and administration of tasks through features such as task creation, planning and assignment, tracking, and reporting.

**Task Management Tool** - is a tool being managed by one or more individuals to put order on their tasks. Task management tools have features and accessibilities that helps users with their management.

**Task Status -** is the current progress of a task.

**Task Views** - are different ways to visualize your tasks (e.g. Kanban, Gantt Chart, Calendar)

**Web Application -** is a computer program that makes use of web technology, performs a specific purpose and is displayed over the Internet.

**CHAPTER 2**

**TECHNICAL BACKGROUND**

Workspaces are seen, especially in enterprises, as a certain area used to keep boards that are related to the same topic or workflow together, or even to keep all the important things for the same team and people, regardless of the subject. Workspaces provide a useful way to see boards and collaborate with all your team members in one place. Web is the area where users are able to visit through the Internet using a browser. A web browser is frequently used to execute web-based applications, which are software that is accessible through the Web over a network connection rather than being stored in memory on a device. Web-based applications can also be client-based, in which a tiny portion of the software is downloaded to the user's desktop but processing is done on an external server through the internet. The user interface (UI) is where users naturally interact with a system. The calendar system provides enterprise workspaces with a powerful visual approach to track and manage their cards, as well as their due dates and start dates. The calendar view provides users with the perspective that users need to arrange and prioritize tasks for the coming days, weeks, and months. A board is the central hub of the workplace, and it may hold any number of lists and cards. A list is a column that includes cards. It's to the users and their project's needs how they utilize and arrange lists. Each list, for example, may represent a team member, and the board would keep track of everyone's responsibilities. Alternatively, a user may set up the list as a workflow, with each card moving from one list to the next as tasks are processed and finished. Cards are the smallest units, which are used to identify tasks that must be completed. The card not only has a name, but can also contain file attachments, images, notes, and other information once being opened. If necessary, users can also make a card template that includes standard information, such as a team checklist. Cards can be opened and edited with a single click, and dragging and dropping cards between lists are as simple as dragging and dropping, allowing new users to get up and running quickly.

**FOREIGN LITERATURE**

Lynn (n.d) has claimed that project or task management tools have key components that can surely make lives and works of its clients easier starting with prioritization. Organizing in accordance to prioritize your tasks such that the most critical tasks are accomplished first, telling that the users can focus on how work should be approached by prioritizing tasks rather than bouncing from one item to another without direction. Second is visualization, it helps users better understand a project as a whole and dependencies become evident and collaboration becomes natural when everything is spelled out in an easy-to-understand manner. Lastly, analysis as the project or task management software provides accomplishments. This reflects that the team or manager can analyze it and use it to have another form of management. According to a NTaskManager website’s blog (2021) a project management software is a system that combines a variety of useful features and modules into a single platform to help anyone who needs to organize and plan their professional or personal tasks. Clients that use project management tools allow users to stay connected and manage roles and responsibilities at their project or tasks. On the contrary, Faust (2018) has pointed out on their blog’s post that project management software is over complicated and the reasons are because of highly customizable project management software it makes the project to have a complex control leaving out the software to be harder to adopt, implemented, learn and use another one is most of the companies making these project management software makes it size one fits’ all, giving every single feature that can be added to it making the project management software challenging to learn because of its broad and bloated features. Project management process includes time management, which, according to IceHrm's blog article, is defined as "time management in the manner you plan and organize your particular tasks and work." In addition, IceHrm (2021) stated that time management has advantages and here are some of the following advantages no waste of time, less friction and problems and spend your time on other things. On the other hand, IceHrm (2021) blog’s article second part says if not able to do it right then person may suffer to its disadvantages like putting on too much weight on himself, procrastination, multitasking and unable to prioritize.

**LOCAL LITERATURE**

Rios (2016) mentioned that the most common problem for students to have is time pressure. Students may even contribute to the loss of time that is ought to be spent on important activities. Rios (2016) added that it is safe to expect that students will lack on organizing their time since they are not usually taught how to flourish their management skills as they grow up. Fortunately, Lam (n.d.) took note that students are still able to prevent the said management problem by committing for an effective management within their regular lifestyles. An article from the Employers Confederation of the Philippines (2021) has stated that the process of having control over managing resources can minimize the deviation from a specific standard. This would mean that students being engaged to improve their ways will become more aware of their impeded situation. Furthermore, students may even have to rely on technology, such as task management tools, in which referring to an article from ChildHope (2021), can help improve their efficiency, ensuring that students are seeing their own efforts.

**FOREIGN STUDIES**

Management tools allow their users to rearrange their tasks on how they prefer it to look like and can make things easier for them. Calvet, Marquès, Arguedas, Daradoumis, & Mor (2021) have examined the data from their study and have concluded that the user feedback to a task management tool was positive. Using a management tool has helped them plan their time thoroughly and encouraged them to work better. Supposing that the traditional automatic notifying system would be added-- this feature will remind users about the tasks that they still need to work on. Regarding notifications, Bhatti et al. (2018) have discussed that reminders are able to attract the users’ full attention, making them behave as if they ought to devote their energy on doing those tasks. As a result, their level of productivity will increase. Urueña et al. (2018) pointed out that these functionalities can make an application more deserving to use, for the users desire to have a dynamic tool that is enough to work on well with their responsibilities. On the other hand, Carter (2020) said that it is nearly impossible to ignore this kind of notification. If someone is working on something significant, his or her focus will inevitably stray, and the productivity will suffer as a result. With more being said by the same author, it takes up to 23 minutes to regain one’s focus after being distracted, and each new notice could put the whole focus at risk for another 23 minutes. In addition to the study of Gudith et al. (n.d), people adjust for interruptions by working more quickly, but this attempt comes at a cost: increased stress, aggravation, time pressure, and effort, in which these factors could cause productivity to be at a low level.

In a related research project made by Sundström and Thelander (2004), it is discussed that many potential users with insufficient technological abilities or unfamiliarity with management tools are to be critically expected. To address this, the usage of the users should be pleasant and intuitive. The said researchers also mentioned that focusing on the perspective of the target audience regarding the user interface of the management tool will greatly affect the management tool’s quality and effectiveness in a positive way. This also means that any graphics that are included in the management tool, such as images and videos, should have enough resolution for the users to view data without any difficulty.

**LOCAL STUDIES**

Lualhati (2019) has analyzed in her study that most of the teachers, as the study’s respondents, are found to be well-organized, productive, and content with their work. Furthermore, the respondents stick to their own effective way or system of managing tasks to commit to their responsibilities, which leads to them being able to sense empowerment and appreciate the simple pleasures of life. With that being said, the researchers of this study intend to comply with the system of Axion to the general standards of students. This will include showing specific terms regarding studies that the students already know. Both the study of Barrot et al. (2021) and Rotas and Cahapay (2020) have stated that the students have repetitive struggles that they are continuously facing, especially amidst pandemic, such as having a poor learning environment. While some are unavoidable due to having limited resources and such, there will be cases where a management tool can be able to cover, aiding students as they face the said struggles, which strives to make them have more self-control and feel more psychologically empowered.

**FOREIGN SYSTEMS**

Andriiuk (n.d.) and Kashyap (2021) have included in their lists the following systems that are related to the system of Axion:

ProofHub is a known project management software that provides teams with a centralized location for collaboration and project completion. Aside from online collaboration, ProofHub also includes capabilities for better communication, visibility, progress monitoring, and accountability. Although Proofhub and Trello can be comparable, the former is better suited when it comes to bigger projects and teams. A team could benefit from their dependency management tool and extensive project reporting, in addition to its easy UI and native time tracking.

Fusioo eliminates the need for several project management tools to keep track of a team's progress. It's the ideal tool for small businesses to become organized since it allows them to establish their online database in minutes and manage projects, clients, ideas, and timesheets all in one place. Within a secure system, this extremely economical project management software allows teams to communicate with both internal and external audiences.

Wrike has a lot of business collaboration and information management capabilities that might help companies to grow. It provides end-to-end project solutions, managing many projects with ease. Wrike has sophisticated task management and customization capabilities that may help a team grow in fast progress.

Asana includes several tools that can assist teams in efficiently managing tasks, information, and procedures. Asana has received praises from many of its users and is widely used by small firms, effectively making team collaboration simple.

Basecamp is a collaboration and workstream platform as well as a project management software. Beyond standard project management, it incorporates a message board, real-time group chat, and other collaboration capabilities.

Monday has a variety of task management choices, including a Kanban board, a list, a map, and a spreadsheet. Another feature is their reporting tool, which will make it easier for an individual to keep track of project progress.

Paymo is a project management software that may assist users with resource scheduling, time tracking, project planning, accounting, file proofreading, and improving team collaboration. It is able to create projects, check their progress using the time tracking tool, and manage workflow using various task views such as Gantt Charts, lists, tables, and Kanban boards.

Teamwork is another popular option, but it has many sophisticated capabilities. Workload and portfolio management, time tracking, reporting dashboards, board view, and Gantt charts are all involved on the list. Teamwork allows users to manage numerous complex projects at the same time.

ClickUp is a popular project management software that aids with planning, scheduling, and managing projects using Kanban boards. It allows users with access to a broader range of tools, such as Gantt charts and timeframes. To improve teamwork, users may plan tasks, subtasks, and even talk with their collaboration.

QuickBase is a cloud-based project management solution that enables users to build more efficient methods of working. It facilitates communication by providing a platform for hundreds of team members, colleagues, and clients to interact and achieve greater productivity. Because QuickBase is a collection of programs, it is very adaptable, allowing users to have specifications to utilize it.

**SYNTHESIS**

Calvet et al. (2021) have examined the feedback of their participants for their study and have stated that the existence of task management tools were enough to support individuals or teams with their tasks, projects, and goals. The statement was seconded by a blog from NTaskManager (2021) wherein for students, task management tools are able to help them on tracking their classes, homeworks, and other activities that are academic-related. A collaboration of team members are even capable of being held within the tools. IceHrm (2020) have added that task management tools help students provide effective learning, prompt a sense of responsibility within themselves, and make them more prepared when facing work-related tasks. By knowing the potential of task management tools, these can be included in the recommendations for certain users, whether for students, companies, and those who desire to put order on their tasks. On the other hand, according to Faust (2018), task management tools with high functionalities and features tend to be more complex due to having a wider area for the users to control, which would likely make the users feel confused and overwhelmed. The users may find it more difficult to adapt to the whole system, possibly affecting their productivity in a negative way, and lessening the capabilities to plan, learn, and use. Therefore, having a brief map of the system may reduce the time being spent by users on learning it, but it shouldn’t affect the specific objective of the system. In another statement by Lynn (n.d) that having effective resources can make the users work rationally and gain more success. It would be significant for a task management tool to indicate its specifications that strive to achieve a unique objective, so that users can know what it will be for and how it should be used.

ProofHub, Fusioo, Wrike, Asana, Basecamp, Monday, Paymo, Teamwork, ClickUp, and Quickbase are the following management tool systems that are considerably related to Axion. The said related systems share the similar user interface, system structure, and objective. As discussed by (Esmeria & Seva, 2017), the user interface is considerably one of the most crucial components for any application, since it heavily displays how effective systems are. The contemporary, minimalistic system design is used by the related systems, since it indicates consistency and modernness. As for Axion, the researchers intend to make the user interface of Axion more perceptive by exhibiting more color and fun-looking fonts. Sundström and Thelander (2004) considers that there would be potential users, which can be students within the secondary year level or less, that are still familiarizing themselves with technology as an academic tool. Axion would be capable of welcoming them through its system design. This feature is what makes Axion mainly unique than the said related systems, which appears to impress higher occupations. Additionally, the researchers aim to provide a semi-casual voice and tone to static texts not only to match the user interface, but also to let the students keep the formalities during their usage.

Another specific feature of Axion is the management system that is developed for users to find it comprehensible, intuitive, and quick to grasp. This is considerably included, for students may find it complicated to control an entire system of the management tool. Being followed by Coursaris & Kim (2011), it might create a gap between the complexity of the system and the interaction of users to it. Axion has features similarly to other related systems, but it specifically aims to focus on what students can work on within its system.

Favorites, which can also be referred to as bookmarks, are implemented in the system to offer students the ability to have faster access to tasks that they have marked, reducing their effort to look for them. Although some of the related systems of Axion have already featured a favorites or bookmark feature, the researchers consider to be more specific with it by covering elements from both individual and group workspaces, whether it can be a board, task, or a subtask.

Priorities are also included in most of the related systems, yet only a few emphasize the tasks with the highest priority. In Axion, a Kanban system will be mainly used by students and to highlight the tasks that need the most attention, Axion automatically sorts any tasks on a desired board from top to bottom, starting with the highest priorities at the top and the lowest priorities at the bottom. Supposing that the users’ reading order is from top to bottom, they’ll be able to see the tasks with the highest priority first. This is also to assert recognizability, stimulating the idea of proper prioritization to students.

**TABLE OF COMPARISON**

| System features | **ProofHub** | **Fusioo** | **Wrike** | **Asana** | **Basecamp** | **Monday** | **Paymo** | **Teamwork** | **ClickUp** | **QuickBase** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| User-friendly, visually colorful GUI | No | No | No | Yes | No | Yes | No | No | Yes | No |
| Easy-to-learn management system | No | Yes | Yes | No | Yes | No | Yes | No | No | No |
| Favorites | Yes | No | Yes | Yes | No | Yes | No | No | No | No |
| Sorting and Emphasizing high-priority tasks | No | No | Yes | Yes | No | Yes | No | No | No | Yes |

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