A New Education System: Reduce Paper Consumption in Education Sector

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***Abstract* – The purpose of this paper is to highlight the important of reducing paper consumption in the educational sector. This proposal has mentioned the significance of carrying out the research and how this proposed system will highly benefit the educational sector on a daily basis. The data collection method for this research has been highlighted to get the most out of the targeted respondents. Similar systems to the proposed system has also been stated in the paper to highlight the major components needed for a good education system. This proposal has come up with a proposed system design and explanation of the features and functions that can be utilised by the targeted audience.**

Keywords— collaborative tools, education system, learning technology, paper consumption

I. INTRODUCTION

The growth of technology and Web 2.0 tools has increased, however the research interest in creating a new comprehensive educational system is very low. Despite these advancements, the education industry continues to use a lot of paper on a regular basis. The rate of deforestation will eventually rise if these growths continue, endangering all living things. The current educational systems offer many suggestions for the tools that should be used in the system. However, it lacks all the features and capabilities needed to run the educational process in a single system (Fathimath Ula Amir, Shounak Ghosh, Chandra Reka Ramachandiran, 2021).

II. LITERATURE REVIEW

A. *Learning Technology for Education*

Learning Technology, also known as educational technology, is a broad word used to cover technological, informational, and communication technologies used to improve instruction, learning, and evaluation. This could entail using multimedia assets or computer-based learning to enhance in-class exercises (Niederhauser, 2018). Tutorials, simulations, productivity tools, communication tools and more are important subcategories of learning technology tools. Word processors and spreadsheets are examples of productivity tools. Even though productivity tools are frequently used in conventional settings and are not necessarily intended for educational use, teachers are now training the students to use those tools too to prepare for working environment (Hodjat Hamidi, 2018). According to Daniel W. Surry, learning technology is any technique or method used to aid in the acquisition, transmission, and retention of knowledge and abilities (Surry, 2008). Surry also trusts in the efficiency of learning technology, engaging teaching and learning through innovative educational design. Numerous parties continue to anticipate the advantages and solutions offered by learning technologies when seen from a practical and productive point of view, despite the fact that the impact of integrating learning technology during COVID-19 still has many faults and shortcomings. With online learning, interactions between teachers and students will be more practical because the people would not need to travel to meet, especially in these challenging times. Anywhere that is conducive and can aid in concentration can be used for the teaching and learning process. Additionally, no extras or needs are needed (Giatman, 2019).

B. *Collaborative Tools for Learning*

According to Elaheh, Cooperative learning's core components can all be found under the banner of collaborative learning, an approach to teaching and learning. Collaborative learning suggests a method of interacting with individuals that places an emphasis on individual talents and contributions (Elaheh Yadegaridehkordi, 2018). Ritushree mentioned that "Where individuals are responsible for their activities, including learning and valuing the abilities and contributions of their peers," is how collaboration is viewed as a way of life (Ritushree Chatterjee, 2020). Online collaborative tools like Google Docs, wikis, and discussion boards are used by instructors to encourage peer collaboration in technology-mediated online learning environments. However, these might also be applied in a way that encourages cooperation as opposed to collaboration. The success of collaborative activities, which in turn promote collaborative learning, is greatly influenced by learners' attitudes toward using these tools. Learners can now connect through social newsfeeds, discussion boards, forums, and messaging apps thanks to collaborative learning technology. Education technology enables student engagement, class debates, and active involvement in the distant and hybrid work environments of today. Students are empowered to learn from one another, explore different viewpoints, and work through problems with peers or lecturers when collaborate in the classroom (Isabelle Miletich, 2021).

Based on previous research, it shows how important is to provide collaborative learning tools, and productive tools that promote student engagement in the education system such as word processors, spreadsheets and so on.

C. *Similar Systems*

Teams for Education

The Microsoft 365 and Office 365 software suites include Microsoft Teams, a cloud-based team collaboration tool. Business calling, video meetings, file sharing, and business messaging are some of Microsoft Teams' primary features. Teams, the main unified communications (UC) service provided by Microsoft, competes with services like Slack, Cisco Webex, and Google Workspace. Teams as shown in Fig 1, 2 and 3. is a communications tool that allows local and distant students and lecturers to work together on content in real time or almost real time across various devices, including laptops and mobile devices. Exchange, PowerPoint, and SharePoint are just a few of the Microsoft business apps that Microsoft Teams connects with (Microsoft, 2022).

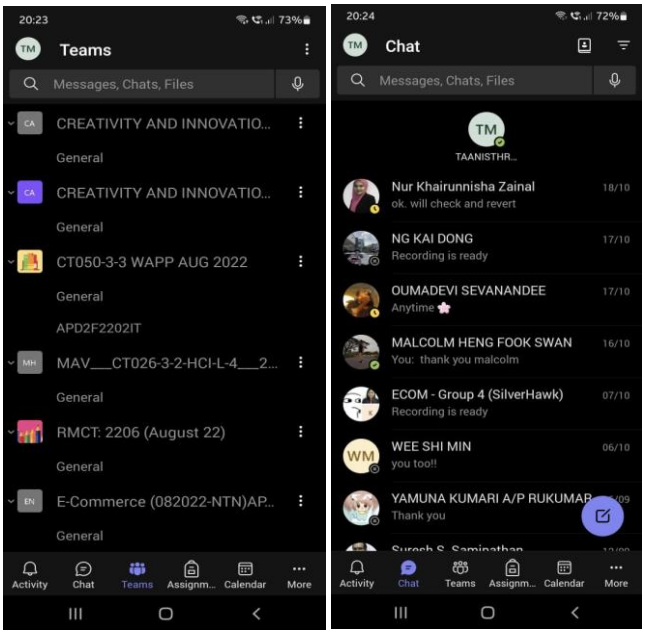

Fig. 1. Teams channels (Microsoft, 2022) and Teams chat functions

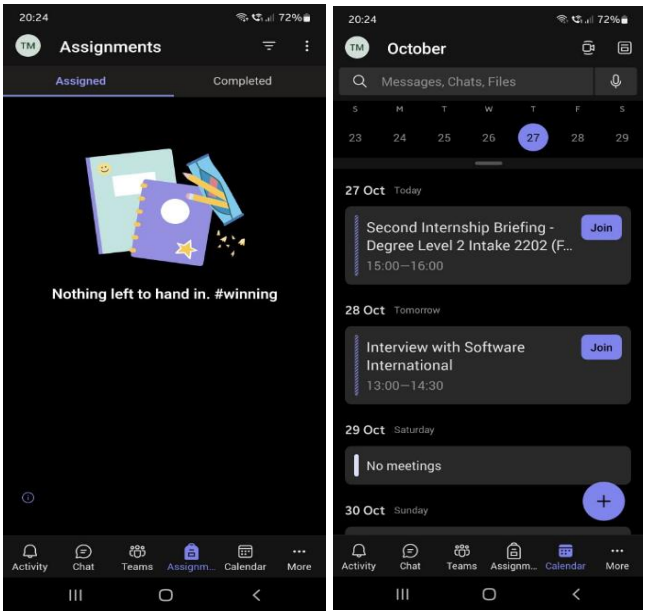

Fig. 2. Teams assignment submission and Teams calendar

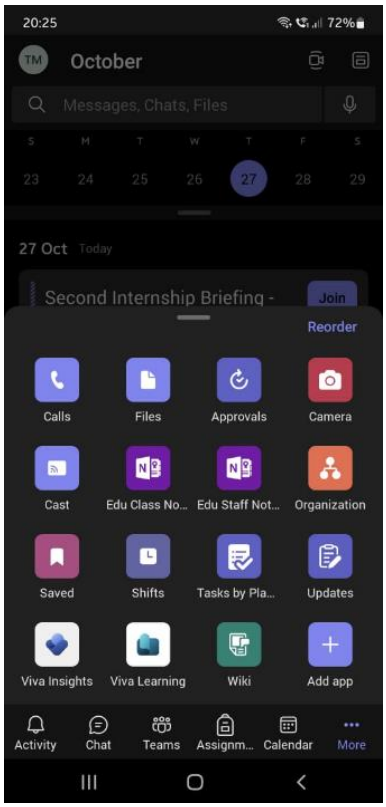

Fig. 3. Teams tools/ apps section

The goal of the Moodle learning platform is to give teachers, administrators, and students access to a single, reliable, secure, and integrated system for building customised learning environments. Martin Dougiamas created Moodle, whose main goal ever since has been to contribute effectively to the e-learning system and to make it easier to pursue online degrees and online education. In reality, Moodle stands for Modular Object-Oriented Dynamic Learning Environment. According to statistics, this learning management system is used by 14 million users who are enrolled in roughly 1.4 million courses (Moodle, 2022).

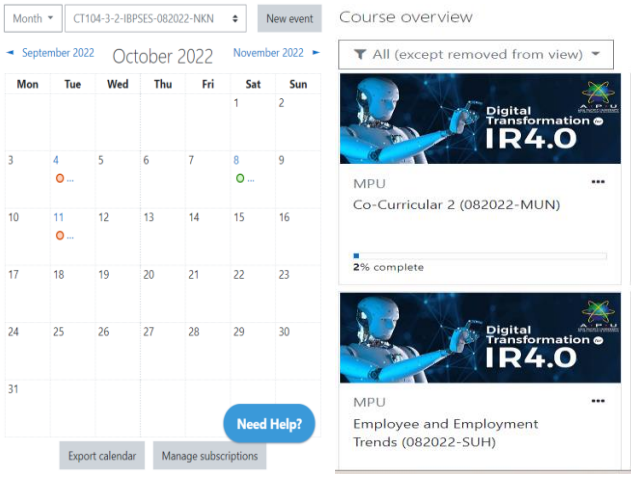

Fig. 4. Moodle calendar together with events (Moodle, 2022) and moodle course cards (Moodle, 2022)

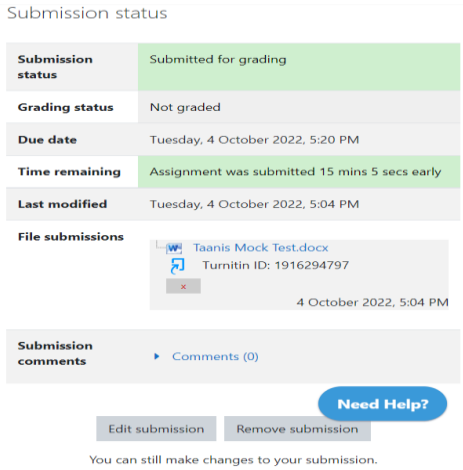

Fig. 5. Moodle assignment submission (Moodle, 2022)

D. *Comparison Table*

TABLE I. SIMILAR SYSTEMS COMPARISON TABLE

Similar System / Features/ Components	Microsoft Teams	Moodle
Call	✓	
Normal Chat	✓	✓
Sending Documents to Peers/Lecturers	✓	
Assignment Submission	✓	✓
Collaborative tools	✓	
Online Examination		✓
Schedule Meetings	✓	
Forums		✓
Create Courses/Modules		✓
Page/Site Customization		✓
Mobile Applications	✓	✓
Calendars	✓	✓
Grading System	✓	✓
Plagiarism Checker		✓

E. *Summarization*

Based on previous researches it shows that limited research has been carried out regarding a proper and whole educational system. Moreover, from the comparison table, can be noted that for the educational system it is important to inherit call and chat functions, assignment submission, grading system and also a version of mobile application. Although these similar systems, Moodle and Microsoft Teams have certain functions in order to carry out academic activities online, there is no one system that contains all the features. Therefore, this research will take into consideration in terms of developing an education system for educational purposes by including all the features which one lags.

III. PROBLEM STATEMENT

A typical school uses an average of 2,000 sheets per day (Records Nation, 2022), the consumption of papers especially for educational purpose are significantly high. There are several ways that papers are used in educational settings. The teacher uses paper for handouts and homework, and students use it to take notes on the lesson. Additionally, for teacher daily reports, school administration tasks, and etcetera. Deforestation activities rise as a result, which causes more severe temperature swings that are detrimental to living beings (Christina Nunez, National Geographic, 2022). Therefore, the usage of paper must be reduced at least by 70% (Lakkala, 2018).

IV. RESEARCH AIM

This research aim is to propose an educational system to solve the consumption of colossal amount of paper for education purposes.

V. RESEARCH OBJECTIVES

- To implement collaborative tools to share resources among students
- To enable students to submit homework and assignments online
- To provide a platform for the students to take the examinations in school but online
- To implement adaptive algorithm-based software for grading
- To enable real-time online face-to-face interaction between students and teachers

VI. RESEARCH QUESTIONS

- What kind of collaborative tools can be implemented in the education system, for the students and lecturers to share resources among each other?
- How are the students going to submit the homework and the assignments through online?
- What needs to be taken into consideration to allow students to take exams online?
- How to implement adaptive algorithm-based software for grading?
- How are students and teachers going to have online face to face interaction in real-time?

VII. RESEARCH SIGNIFICANCE

This project will be equipped with all the necessary features to maintain uninterrupted educational operations. Running this initiative has a significant potential to benefit both students and teachers. Students will gain from this project because it will make learning simpler and more convenient for wherever the students are. Even if students could not physically attend classes due to unforeseen circumstances, students can connect with peers online, share lessons, and learn in engaging ways. Even if a teacher is sick, classes can still be held online. Additionally, this endeavor broadens horizons and fosters knowledge, empathy, and new relationships. Additionally, this project helps students not only acquire higher-order thinking abilities but also gain confidence and self-esteem.

Teachers do not have to struggle to carry heavy book loads or print a lot of papers for students, then pin those, and so on. Teachers can update weekly records and attendance using the system (Luai Ahmed Haidar Al-Mesbahi, Julia Juremi, Mohamed Shabbir Hamza, 2021), as well as distribute homework to students. Instead of spending a lot of time manually updating the grades for each student, teachers can use the system which updates automatically.

Using this system, school administration can also check students' records and handle payments and other administrative tasks. One can use the system to prevent other windows, apps, or even tabs from being launched while taking an online assessment to prevent cheating. The assessment page will close down immediately if a student tries to cheat.

The research's main goal is to find a way to reduce the enormous amount of paper used for educational purposes. Since, all tasks that formerly required paper may now be completed utilising the system that progressively minimizes paper usage, which also reduces deforestation. Deforestation will not be reduced if this research is not being conducted and the system itself is not put in place. This creates a greater threat since deforestation puts all life on Earth at risk, producing harmful carbon emissions and worsening the climate problem. Therefore, it should not be permitted to occur.

VIII. METHODOLOGY

A. *Identifying Respondents*

The respondents that are targeted for this survey are primary school teachers, secondary school students, secondary school teachers, primary school administrations, secondary school administrations, university students, university lecturers and university administration. These individuals make up the majority of those working in the educational field, experiencing or going through the process on a daily basis, and utilising the most paper. The selected responders are also more susceptible to technology in the modern environment because of their frequent use. Students in primary school aren't participating in these processes since primary school students may have a hard time adjusting to technology and complying with teachers' instructions.

B. *Sample Size*

120 respondents will be sufficient to conduct the survey. 120 respondents will be divided to the targeted 8 categories Therefore, the 120 respondents will be, 15 primary school teachers; 15 primary school administrators, 15 secondary school students; 15 secondary school teachers; 15 secondary school administrators; 15 university students; 15 university lecturers and 15 university administrators. These respondents will be taken all over Malaysia from each state due to the varied environment in different states.

C. *Sampling Method*

The sampling method that can be used in this research is a stratified sampling which falls under complex probability sampling. Stratified sampling is a probability sampling method used in sample surveys. The target population's constituent parts are divided into discrete groups or strata, and individuals within each stratum are comparable to one another in terms of a few salient survey-relevant factors. In order to increase the effectiveness of sample design, stratification is also used to reduce survey costs and increase estimator accuracy (V Parsons, 2017).

The mentioned population (B Sample Size) are divided into the strata of primary school teachers, secondary school students, secondary school teachers, primary school administrations, secondary school administrations, university students, university lecturers and university administration.

Then from each category, equal number of respondents which are 15 respondents from each category will be chosen as mentioned earlier. This approach is advantageous because it enables researchers to swiftly gather a sample population that accurately depicts the whole population under study.

D. *Data Collection Method*

Surveys will be used to get information from the selected respondents. A survey is a set of questions used in human subject research, with the goal of gathering specific information from a certain sample population. Surveys can be carried out via the phone, by mail, online, at street corners, and even in shopping centres. Once data has been collected, survey data will be statistically analysed to produce reliable study results (QuestionPro, 2022).

Six questions with 5-point Likert scales, four multiple-choice questions and one open-ended question will be included in the survey. Prior to distributing the survey questions to the respondents, preliminary pilot testing will be carried out after the survey questions have been generated. This implies that professionals will review the survey and provide feedback on the representativeness and relevance of the questions (Joy Fraser, 2018). Respondents will receive an email when the survey has been updated.

Since it takes a while to travel between states, this study will use an online technique to conduct its survey using online digital platforms, which will be convenient and efficient. Each participant will receive an email containing the survey, which will be created in Microsoft Forms and distributed. This technique enables researchers to swiftly and efficiently acquire information from a specified audience at a specific time point.

The answer to the question will result in the opinions of the respondents for the proposed system and other suggestions to improvise the idea. In order to analyse and interpret the results the researcher will use regression analysis method. A strong statistical technique for examining the relationship between two or more relevant variables is regression analysis. Regression analysts look at the impact of one or more independent variables on a dependent variable at the fundamental level (Benjamin A.Younga, 2019). The interpreted information will finally be presented in a graphical manner such as pie chart and graphs in order to obtain better understanding.

IX. OVERVIEW OF THE PROPOSED SYSTEM

A. Teacher Use Case Diagram

Fig 6. shows the use case diagram of the teachers (primary and secondary) and lecturers. Teachers and lecturers can view the current tasks that have been given to the students by clicking on the view assignments button. The submission date can be changed, the assignment question can be updated to the most recent version, and so on, by teachers and lecturers by clicking the edit button. If the folder is empty, the teacher or lecturer can make a new assignment for the students. If the user (teachers or lecturers) later decides not to provide the assignment, can delete it using the delete assignment feature. Since one of the system's goals is to adopt adaptive algorithm-based grading, teachers or lecturers can see and amend the grading in accordance with the assignments marking scheme and apply to all for automatize marking and grading.

The user can also view the individual student's marks and grades using the view marks function and update the mark if the user wishes to provide extra marks for the students. Moreover, the teacher or lecturer can also delete the marks and award the student zero if there is any academic fraud encountered. Moreover, the teacher or lecturer can view the statistics. For instance, the students who submitted the assignment and whom not, the time of the assignment submitted, whether or not the students have attempted the question and so on.

Teachers and lecturers can also record the daily or weekly programs and progress in the logbook using the system for later sending to the management. The users can view the current or existing logbooks using the view logbook button. The logbook date can be changed, some details in the logbook can be updated to the most recent version, and so on, by teachers and lecturers by clicking the edit button. If the folder is empty, the teacher or lecturer can create new log books using the create log book feature and delete it, using the delete feature if it is not unnecessary.

Another feature is that the user can view the existing meetings list via clicking on the view meeting button. If teachers or lecturers had an emergency for example, and want to cancel the meeting then can use the delete meeting feature. In case, there is in need to change the scheduled meeting time or date the users can click on the edit button and make changes.

The teachers and lecturers can also chat and call with peers or students using the chat functions and delete the chat if no longer necessary and to prevent congestion. The final function for teachers and lecturers is view calendar function. This function shows the weekly schedule of the classes or any events the teachers and lecturers need to attend.

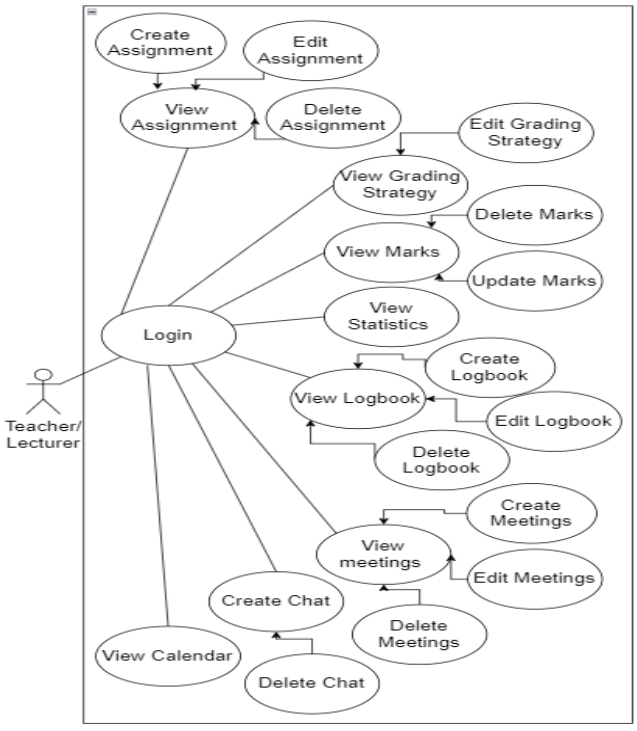

Fig. 6. Teachers' (primary and secondary school) and lecturer's use case diagram for proposed system

B. *Student Use Case Diagram*

Fig 7. shows the use case diagram for students. Students can view the current tasks that have been assigned by the teachers or lecturers by clicking on the view assignments button. The students can see who assigned the assignment, when is the due date and time and so forth. Once the student clicks on one of the assignment links, the student can upload the assignment files by clicking on the edit button. If the students have accidentally uploaded the wrong document, then can click on the remove button to eliminate the existing documents. Then the students can click on the submit button to submit the document.

The following function is for taking the examinations. The student can click on the view examination button in order to see the list of examinations the student has to take. Once the students click on the take examinations button, a new screen will pop out specially designed for the examination purposes. The students will not be able to operate anything outside of the system. For example, opening new tabs, windows, other additional notes and so forth. Therefore, schools and universities do not have to worry about the students cheating in this manner while using this system. This way the amount of paper used during the examinations will also tremendously be reduced.

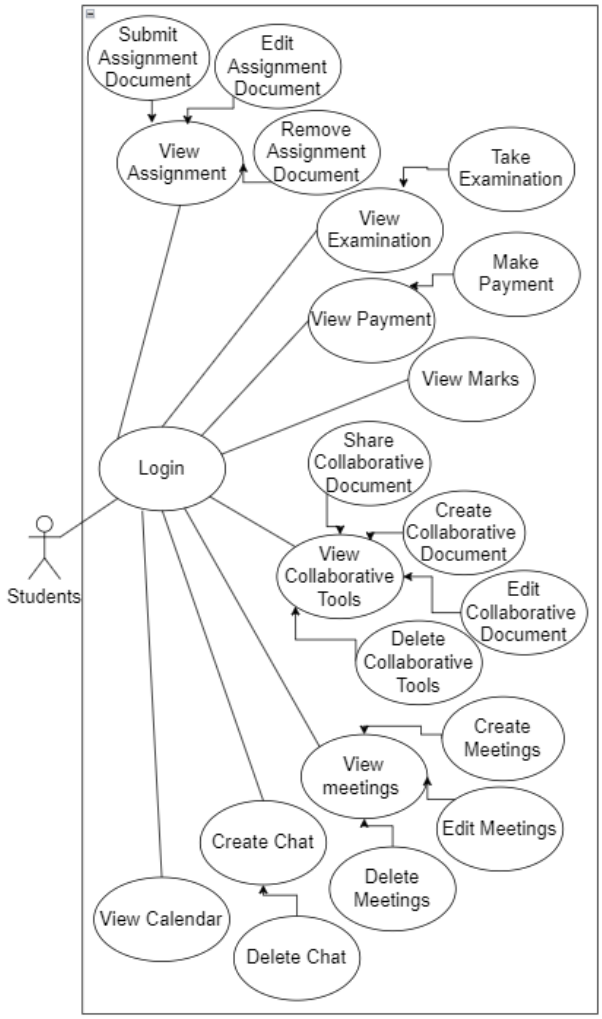

Fig. 7. Diagram 2: students use case diagram for proposed system

Next function is to make payment. This system allows user to make payment through online. The students have to click on the view payment which shows the payment list that need to be completed and also the statistics of the previous payments. For example, April payment, march payment, exam retake fees and etcetera. The students can click on the make payment button and complete the payment which then the system will automatically send the payment document or receipt straight to the registered email.

Furthermore, the students can view the marks from this system according to the subjects and yearly basis for the secondary school students. Collaborative tools like one note, word documents, PowerPoints and so forth are available in the system whereby can be used by the students. The students can click on the view collaborative tools in order to view the list of tools available in the system. Then, the students can click on the create button and name the document. If the user desires to share the work together with the peers then can click on the share collaborative tool and add the peer in. This way the students can learn and gain knowledge from each other. The meeting, calendar and chat functions are the same as the teachers and lecturers.

C. Administrator Use Case Diagram

Fig 8. shows the use case diagram for administrators. The administrator can view the students and teachers/lecturers' details by clicking on the view button. When a new student or teachers/lecturers join the organization, the admin can create folders and assign with ID. The admin can also update the details of student or teachers/lecturers' such as contact number, personal email, person next of kin address and so forth. The admin can also use this function to enable students to take examination, when the payment has not been made.

The admin can also view the logbook through admin account once the teachers submit using the teachers' account. Moreover, the admin can create, edit, view and delete the courses for specific cohorts.

Once the student has already completed the course, the certificates will be automatically generated in the system. The admin can, therefore, click on the generated certificates and search for the student number. If the student drops out from the university, then the admin can delete the certificates or update if there are any mistakes in terms of names, or graduation date and so forth.

The make payment is when the admin helps the students to update the record when the students make payment physically. Then can click on the send digital receipt to automatically send the receipt to the specific student's email. Otherwise, the meeting, calendar and chat functions are the same as the students, teachers and lecturers.

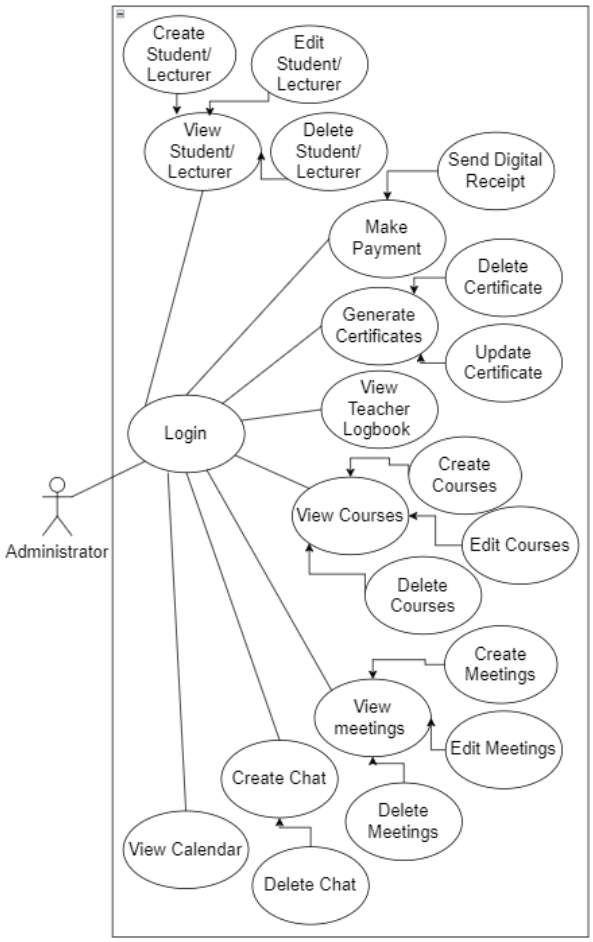

Fig. 8. Administrator use case diagram for proposed system

X. OVERVIEW OF THE PROPOSED SYSTEM

In conclusion, this proposal has to be taken into consideration and reduce significantly high amount of paper usage in the education sector. The current education system does not involve all the tools needed for the target audience to use. For example, adaptive marking algorithm, taking examinations without allowing students to commit fraudulent activities and so forth are not available in any of the education system. Just in 2019, more than 34 billion sheets of paper are utilised annually. If each page is only 5 cents, then it will cost around $2 billion per year to supply paper to every child for school. Comparatively, if every child received a laptop, even the youngest kindergarteners, it would cost nearly $8 billion. In other words, eliminating the use of paper in schools might pay for a laptop for each child in 4 years. Therefore, the minister of education needs to be involved in this research to support schools in order to provide the technology needed for the targeted audience.

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