DIGIWIZ: AN OPEN-SOURCE LEARNING PLATFORM

Agarap, Chris John M.
BSIT-SMBA
Sun Residences,
Quezon City
0995-027-8099
chrisjohn.seej@gmail.com

Baldonado, Rex Christian B.
BSIT-SMBA
1852 Road 13 Fabie Estate,
Paco, Manila
0945-673-3986
rcb122398@gmail.com

Cabahug, Jeane E.
BSIT-SMBA
451 Arayat St., Mandaluyong City
0917-471-7864
jeane.cabahug@gmail.com

Danao, Beatrizce Anne R.
BSIT-SMBA
Mandaluyong City
0927-268-1742
rcb122398@gmail.com

Palafox, Shayne Hazel M.
BSIT-SMBA
258 Almazor St., Brgy 185,
Pasay City
0966-205-1690
enyahs.fox@gmail.com

Prof. Ramir Ramirez
FEU Institute of Technology
rrramirez@feutech.edu.ph
Course Adviser

ABSTRACT

The United Nations found that around 265 million of the children are out of school and approximately 22% of them are supposedly enrolled in primary school. People, regardless of age, race, or gender, have right to education. To ensure that everyone has access to education, the United Nations established a goal for quality education as one of their sustainable development goals, a blueprint to achieve a sustainable future for all. This aims to provide an inclusive and quality education for all, and to promote lifelong learning. Thus, the researchers created the system DigiWiz: an open-source learning platform that would help support United Nations' goal for quality education. To evaluate the effectivity of the system, 10 primary school students and 4 college students are asked to test the system. Based on the results from the respondents' assessment, majority of the respondents agreed that the system met the functionality, performance, reliability, supportability/security, and usability.

INTRODUCTION

A. Purpose and Description

The right to education is a major human right. Each person, independent of race, sexual orientation, nationality, ethnic or social origin, religion or political inclination, age or handicap, is qualified for free basic education. Education gives us a learning of our general surroundings and changes it into something better. It develops in us a perspective of looking at life. It encourages us to build opinions and have perspectives on things throughout everyday life. According to the United Nations latest statistical data, over 265 million children are currently out of school and 22% of them are of primary school age. Additionally, 617 million kids worldwide lack basic mathematical and literacy skills. Because of this, providing quality education has now been established as one of the sustainable development goals of the United Nations.

In order to support the United Nations' sustainable development goal, our group will develop DigiWiz, an open-source learning platform. The platform's goal is to help people learn certain subjects for free with the help of registered instructors. These instructors will have the freedom to add courses/topics that they want to share with those who are willing to learn. For it to be a success, the contents of the instructors' created courses will be monitored by the system admin to prevent any duplication of courses and possible fraud.

B. Significance of the Study

The DigiWiz, an open-source learning platform, is beneficial to the following:

- **Learners.** With the help of this learning platform, the learners, whether enrolled in school or not, can gain more knowledge or even further enhance their basic skills. This will serve as their school for basic education. Out-of-school children can also learn in this platform, as a substitute for primary education.
- **Lecturers.** Lectures will benefit from this platform, since they will have the opportunity to share their knowledge. This can also serve as their activity to help the less fortunate kids who cannot enroll in a proper school.
- **Parents.** Through this platform, the parents of the students will be able to track their child's progress in terms of their basic learning foundation. This can help them determine what specific area their child is excelling at and having difficulty with.
- **United Nations.** The organization can benefit from this project since this can contribute to their goal for quality education.

C. Objectives

The general objective of the project is to develop a web platform for people to learn various subjects/topics based on the level of knowledge they need. Specifically, this project aims to fulfill the following:

1. To develop the features of DigiWiz: An Open-source Learning Platform such as:
   - a user-friendly interface to help people understand the platform easily
   - an initial course for basic education
   - an open source module that lets instructors begin a course
2. To create user roles such as:
   - students that can enroll in courses
   - instructors that can start a course and share learning materials
   - an admin that approves the content given by instructors and monitors the entire system
3. To provide a dashboard for the visualization of the platform's data.

D. Scope and Delimitation

The system focuses on the improvement of learning of students. The users of the system are primary school students and teachers. Users must be registered in order to access the modules uploaded by the teachers and to upload a module, if the user is a teacher. The proposed system is only accessible by the students, teachers, and admin, each with selected functionalities. The system includes the following: (1) a page wherein teachers create a lesson where they can include photos and videos to further explain the lesson, (2) courses page where the users can see all the courses available and rate the courses they are enrolled in, and (3) quiz page for students in order for them to assess their knowledge about the lesson.

E. Project Outputs & Performance Indicators

In this section, expected outputs or the deliverables are listed along with its performance indicators. Outputs are used to determine the projects' success.

Table 1: *Project Output and Performance Indicators*

Expected output (deliverable)	Performance indicators
User-friendly Interface	The graphical user interface must be easy to navigate for all types of users.
Initial course for basic education	Among the existing courses, there must be an initial course for basic education that is created by the developers.
Admin module	The admin module must incorporate all necessary features needed for performance, security, and maintainability.
User Access	Different user roles must have different privileges and features involved in the entire system.
Overall Database Structure	The database must have a realistic and logically correct structure.
Dashboard	The dashboard must have summaries for visualizing data.

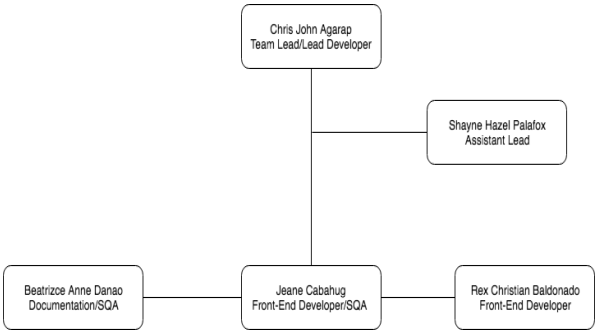
F. Project Budget

Budget Item	Amount
Project personnel	₱ 0.00
Materials & supplies	₱ 0.00
Travel, transportation & communication	₱ 0.00
Printing & reproduction	₱ 500.00
Capital expenditure	₱ 0.00
Contingency	₱ 0.00

G. Work Plan

Major activity	Milestone Indicator	Target completion date
Planning	The overall system plan has been established and is ready for development.	May 09, 2019
Development	The system has been fully developed and is read to be tested.	June, 2019
Testing	Each module of the system has been tested and proven to be working properly. The system is now ready for the presentation to the panel/s.	June, 2019
Presentation	The system has been presented and was approved by the panel/s	June, 2019

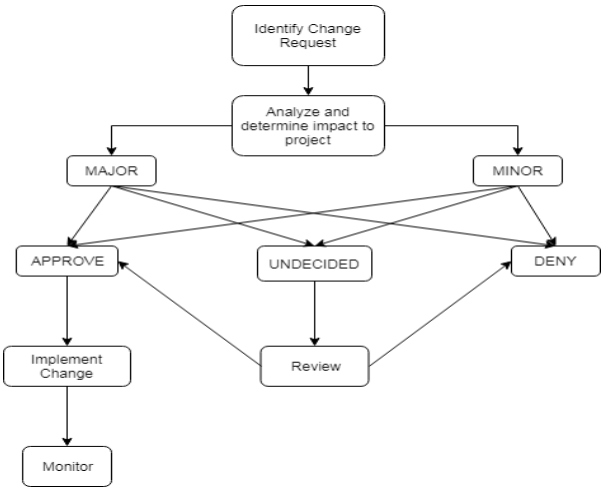
H. Project Organization



I. Risk Management Plan

Key success factor	Risk	Countermeasure
Promoting website	There is a possibility of not reaching the target audience	Aside from Social Media, the website is promoted through NGOs
Users regularly visiting the website	Users might only try it for a while, or they might be bored as they use it over time	Update website and offer new features that the users find useful for them to continually use the website
Contents uploaded by the instructors	There might be a duplicate content	Content should be approved first by the admin to offer students a good quality content
Usability and interface design	Users might have a hard time figuring out how to use it and the website might be not appealing to them	Run simple tests and get feedback from a few people from our target demographic (elementary and high school students, and instructors)
Instructors contributing modules	There might be a time where instructors are not uploading modules	Admin or future developers should upload modules to keep the website updated

J. Change Control Plan



K. Quality Management Plan

Quality Management Approach

It is the approach the team will use for quality management throughout the development of the project. Quality must be planned to prevent unnecessary rework, waste, cost, and time. The approach must be defined and communicated to all project stakeholders.

Quality Requirements/Standards

It should describe how the project team and/or quality group will identify and document the quality requirements and standards. Additionally, there should also be an explanation of how the project will demonstrate compliance with those identified quality standards.

Quality Assurance

It should explain how the team will define and document the process for auditing the quality requirements and results from quality control measurements. This section should also document the actual quality assurance metrics used for this project.

Quality Control

It describes how the team will define and document the process for monitoring and recording the results of executing the quality activities to assess performance and recommend necessary changes. Quality control applies to the project's product as opposed to its processes.

Quality Control Measurements

It should contain a sample or useable table/log to be used in taking quality measurements and comparing them against standards/requirements. The most important aspect of this log is to provide documentation of the findings in the Quality Management Plan. If actual measurements do not meet the standards or requirements, then some action must be taken.

II. MATERIALS AND METHODS

A. Requirement Analysis

Technical Feasibility

Table 2: *Hardware and Software Requirements*

HARDWARE	SOFTWARE	TECHNICAL SKILLS
• Intel i5 or i7 processor, 4th generation or newer (Virtualization must be supported) • Minimum of 1600x900 screen resolution. • 500GB or more disk storage, Performance HDD with 16 – 64 MB Cache or SSD recommended. • Minimum 4GB of RAM (6GB RAM recommended) • Stable internet connection	• Git • PyCharm • Sublime • Trello	• Django • JavaScript • SQLite

Table 2 shows the hardware and software requirements in developing the system. For the hardware requirements, the team requires a laptop that meets the specifications needed to support the development of the system. For the software requirements, Git, PyCharm, and Sublime should be installed since it will be used to develop the system. Also, the team should have a Trello account since this where all the tasks are posted.

Schedule Feasibility

The target time frame for the development of the system is 1 month. It includes the development of user interface, functionalities needed, and the database.

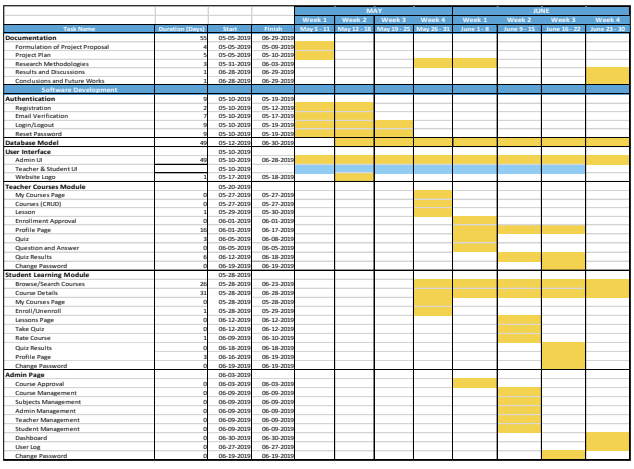


Figure 1. Gantt Chart

Figure 1 shows the groups progress for the past months and indicates the duration a task is accomplished. The Teacher and Student UI took the most time to accomplish while the Admin page are within the day it is started.

B. Project Design

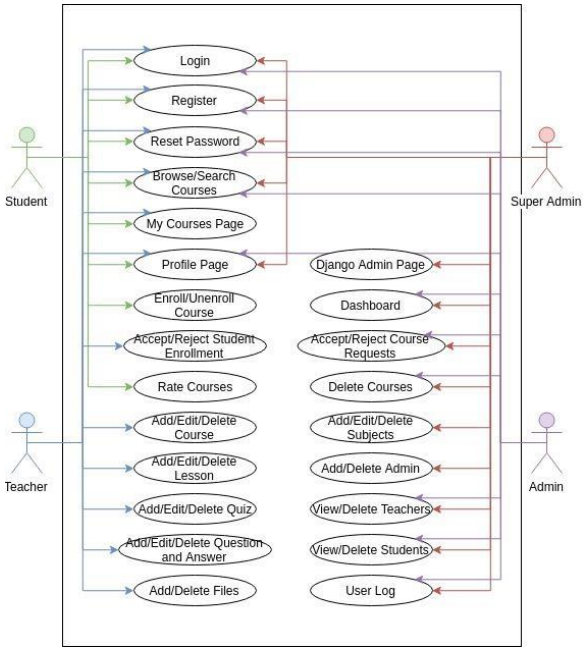


Figure 2. Use Case Diagram

Figure 2 indicates that the student can enroll or unenroll a course and rate enrolled courses. The teacher can accept or reject student enrollment request, can add, edit, and delete courses, lessons, and quizzes. The admin can view the dashboard and track user activities. The super admin can access the Django admin page and can add or delete admin and subjects.

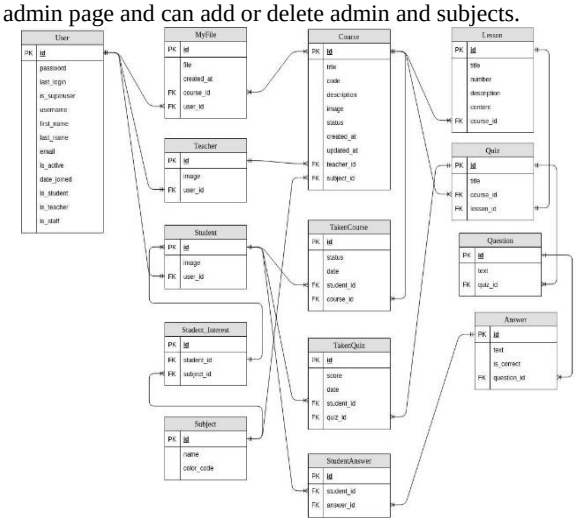


Figure 3. Entity Relationship Diagram

Figure 3 shows the entity relationship diagram of the system that shows the relationship of the people, objects within the system.

Figure 4. Home page

Figure 5. About us

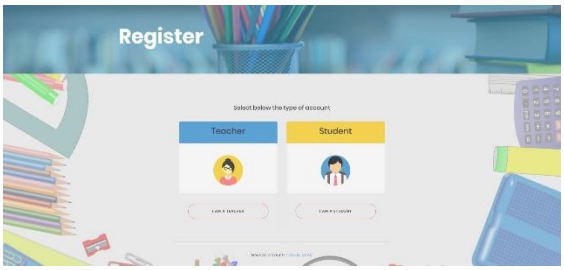


Figure 6. Registration page

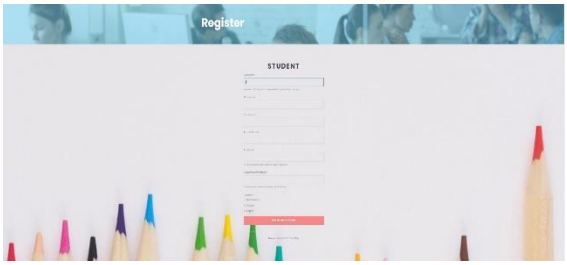


Figure 7. Registration Form (Student)

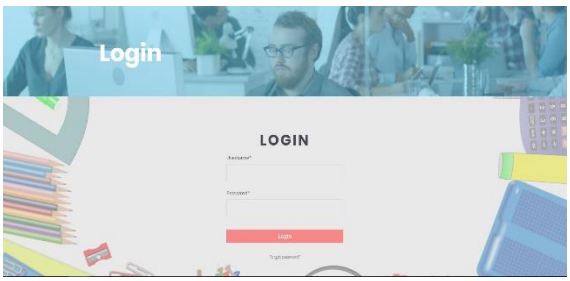


Figure 8. Login Page

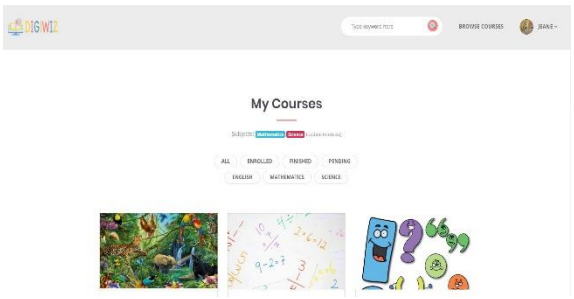


Figure 9. Home page (Student)

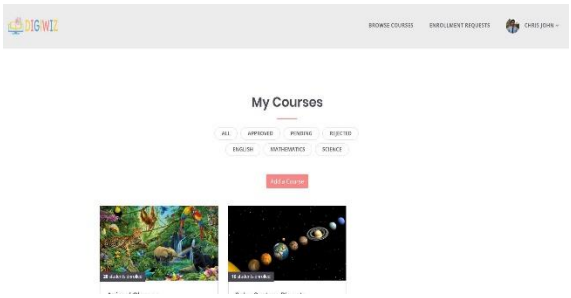


Figure 10. Home page (Teacher)

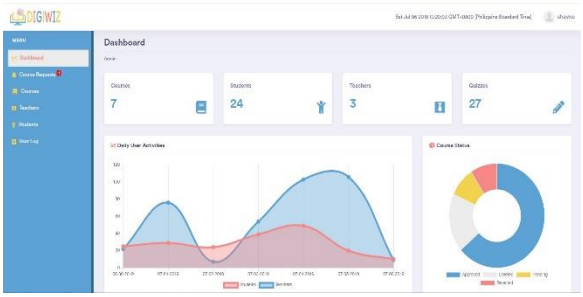


Figure 11. Home page (Admin)

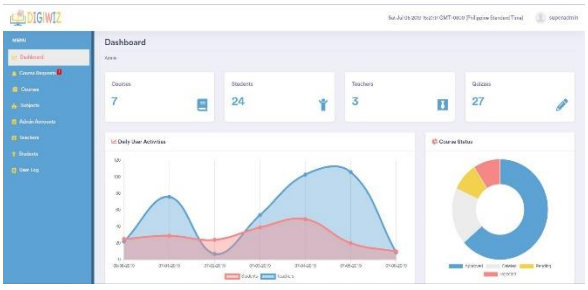


Figure 12. Home page (Super Admin)

Figure 13. Browse Courses page

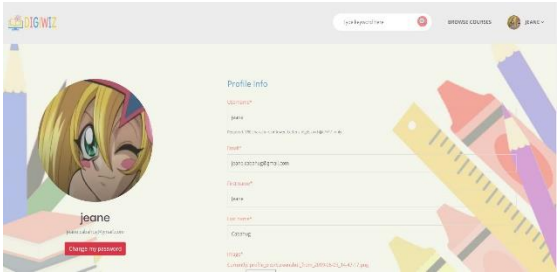


Figure 14. Student Profile

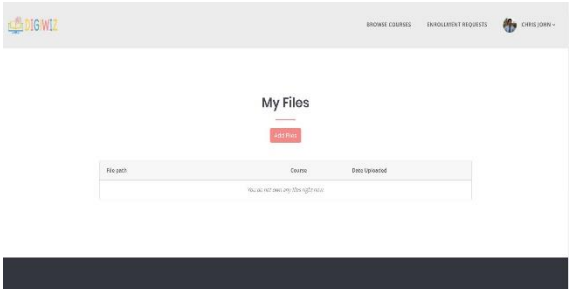


Figure 15. My Files page (Teacher)

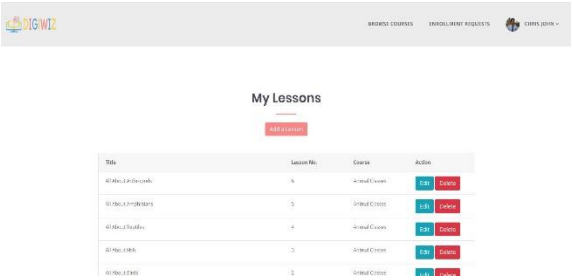


Figure 16. My Lessons page

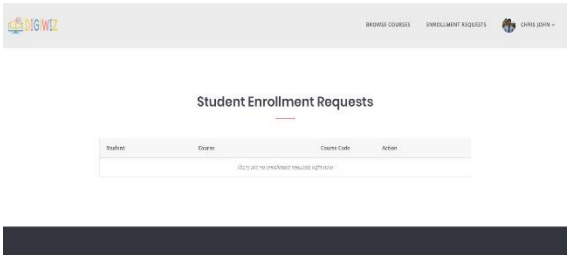


Figure 17. Enrollment Requests page

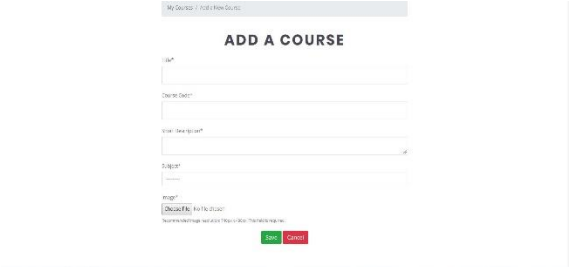


Figure 18. Add Course

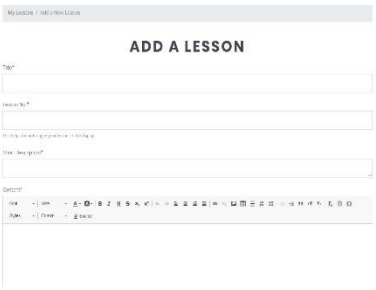


Figure 19. Add Lesson

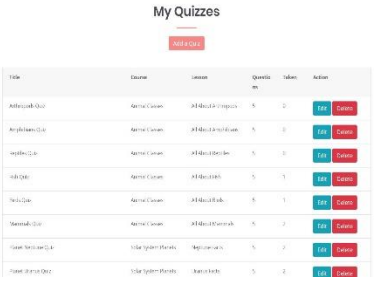


Figure 20. My Quizzes page

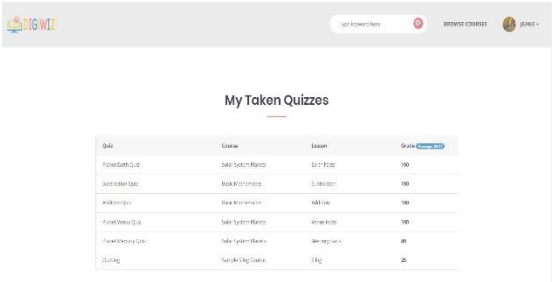


Figure 21. My Taken Quizzes page

C. Project Development
Agile Modeling

In Agile method, one must set the goal of the project, the main task the proponent wants to achieve. Then the end-user must provide the team with a backlog wherein all the requirements are listed that filled what one wants to achieve. Then the team decomposes the backlog in a process called sprint where the team picks some requirement that they can achieve in a specific time frame. Then the team performs the requirements chosen. A meeting must be set with the end-users where one talks about the backlog and ask them what functionalities they want the team to accomplish in a sprint and the team should talk about what they can do from the backlog given by the end-user. During the execution of the requirements, the team must organize a meeting where they talk about what they did yesterday, what are they going to do today, and what are the tasks to be accomplished tomorrow. Then a sprint review, the team shows to the end users what they have accomplished at the end of the sprint. The figure 17 below shows how the agile model works.

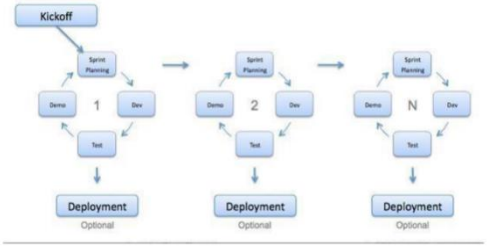


Figure 22. Agile modeling

D. Data Gathering Procedures

For the purpose of this research, the group decided to use both the methods: Quantitative and qualitative. Quantitative method is used for data that can be measured with numbers which is best for surveys. While on the other hand, Qualitative method studies things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. The group decided to have at least 10 kids aging 5 - 9 to test the overall system, since this is the age bracket mainly targeted of the research.

E. Testing

Before the implementation of the system, a series of tests was conducted. The said tests were done during the development of the system in order to identify the possible risks, the future problems, the user acceptance, and the defects that need to be changed. Also, to make sure that the system is ready to be presented to the adviser and the panel.

F. Sampling Technique

The researchers decided to do purposive sampling for their sampling technique because the respondents chosen for the survey are primary and college students. In purposive sampling, the respondents, primary students and college students, are chosen because they can evaluate the system well since they are the target users of the system and they have enough knowledge, respectively. The respondents for the system can be selectively chosen and for selective respondents, purposive sampling is the best alternative.

G. Statistical Treatment

The weighted mean formula was used to determine the average percentage of the results obtained and the frequency Also, it can be utilized to give information on the most recurring operation error of the company. The questions that were given to the respondents can be answered with scales from 1-5 with 5 being the highest.

Table 3: *Likert Scale*

Scale	Range	Interpretation
5	4.6 – 5.0	Strongly Agree
4	3.1 – 4.5	Agree
3	2.8 – 3.6	Fair
2	1.9 – 2.7	Disagree
1	1.0 – 1.8	Extremely Disagree

Likert, R. (1932). 5-point Likert scale.

The Weighted Mean formula and the Frequency Distribution was used to measure the general response of the survey questionnaires, whether they agree to a given statement or not

$$\overline{\sum}_{w\,i} = \frac{\sum w_i \; \sum X_i}{\sum w_i}$$

Figure 23. Weighted Mean Formula

Figure 23 above shows the formula for the weighted mean is as follows: ∑ as the sample mean, was the weight given to each respondent, and X as the number of respondents.

$$\frac{part}{whole} \times 100 = \%$$

Figure 24. Percentage Formula

Figure 24 above shows the formula for getting the percentage. The part serves as the scale and the whole serves as the range.

III. RESULTS AND DISCUSSION

This section discusses the different results of the respondent assessment based on the functionality, usability, reliability, performance, and security of the system. The survey conducted required a total of 14

respondents which consist of (10) primary students ages from 5 to 9 and (4) college students. The results gathered from the survey was presented in different tables and is discussed respectively.

A. Presentation of Results

The tables below are the results of the respondent's assessment based on the functionality, usability, reliability, performance, and security of the system.

Table 4: *Summary of Respondents*

GROUP	(*f*)	(%)
Primary Students	10	71
College Students	4	29
Total	14	100

Table 4 shows the total frequency distribution of the two different respondents chosen subjectively by the researchers. There is a total of 14 respondents divided separately between the primary students and the college students. There are (10) primary students and (4) college students.

Table 5: *Summary of Respondents Rating in terms of functionality.*

AREA	PRIMARY STUDENTS		COLLEGE STUDENTS		GENERAL AVERAGE	
	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation
1. The system protects itself from intrusions	4.3	A	4.52	SA	4.41	A
2. The system handles several amounts of data without causing a system error/s	4.34	A	4.35	A	4.34	A
3. The system can generate the reports needed by the users	3.51	A	3.52	A	3.51	A
4. All the operations of the system are functional	4.55	SA	4.54	SA	4.54	SA
5. The system stores accurate data in the database	4.55	SA	4.55	SA	4.55	SA
COMPOSITE MEAN	**4.25**	**A**	**4.29**	**A**	**4.27**	**A**

Legend: Strongly Agree (SA), Agree (A), Fair (F), Disagree (D), Strongly Disagree (SD)

Table 5 shows the results of the conducted survey for the overall functionality of the system. According to the results, both the sets of the respondents agreed that the system has the capability to protect itself from intrusions which got an average mean of 4.41. The respondents also agreed that the system can handle several amounts of data without causing any system error/s which got an average mean of 4.34. The respondents agreed that the system can also generate the reports needed by the users according to the respondents which got an average mean of 3.51. Also, both the respondents agreed that all the operations of the system are functional which got an average mean of 4.54. and lastly, most of the respondents agreed that the system stores accurate data in the database with an average mean of 4.55. All in all, the functionality of the system got an average of 4.27 and that indicates that the system is fully functional.

Table 6: *Summary of Respondents Assessment on the proposed system in terms of usability.*

AREA	PRIMARY STUDENTS		COLLEGE STUDENTS		GENERAL AVERAGE	
	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation
1. The system has a user-friendly interface	4.57	SA	4.55	SA	4.56	SA
2. All the necessary buttons/actions are present in the system	4.53	SA	4.55	SA	4.54	SA
3. The expected actions/tasks needed in the system can be carried out by the users	4.51	SA	4.56	SA	4.53	SA
4. The system fully caters the needs of the organization	4.45	A	4	A	4.22	A
5. The system is convenient to use	4.53	SA	4.53	SA	4.53	SA
COMPOSITE MEAN	**4.51**	**SA**	**4.43**	**A**	**4.47**	**A**

Legend: Strongly Agree (SA), Agree (A), Fair (F), Disagree (D), Strongly Disagree (SD)

Table 6 shows the results of the conducted survey for the overall usability of the system. According to the results, both the sets of the respondents agreed that the system has a user-friendly interface and got an average mean of 4.56. The respondents also agreed that the system has all the necessary buttons/actions and are all present in the system which got an average mean of 4.54. The respondents agreed that the expected tasks/actions needed in the system can be carried out by the users got an average mean of 4.53. The respondents also agreed the system can cater the needs of the organization which got an average mean of 4.22. and lastly, most of the respondents agreed that the system is convenient to use that got an average mean of 4.53. All in all, the usability of the system got an average of 4.47 and that indicates that the system is already usable.

Table 7: *Summary of Respondents Assessment on the proposed system in terms of reliability.*

AREA	PRIMARY STUDENTS		COLLEGE STUDENTS		GENERAL AVERAGE	
	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation
1. The system has a backup storage for the database in case of failure	4	A	4.51	SA	4.25	A
2. The security of the system is strong and cannot easily be hacked	4.35	A	4.53	SA	4.44	A
3. The reports generated by the system are accurate	4	A	4.53	SA	4.26	A
4. All information in the system are up to date	4.4	A	4.5	A	4.45	A
5. Files can be easily recovered in case of a system failure	4.35	A	4.49	A	4.42	A
COMPOSITE MEAN	**4.22**	**A**	**4.51**	**SA**	**4.36**	**A**

Legend: Strongly Agree (SA), Agree (A), Fair (F), Disagree (D), Strongly Disagree (SD)

Table 7 shows the results of the conducted survey for the overall reliability of the system. This will prove if the security of the system is resilient. According to the results, both the sets of the respondents agreed that the system has the backup storage for the database in case of failure which got an average mean of 4.25. The respondents also agreed that the security of the system is strong and cannot easily be hacked which got an average mean of 4.44. The respondents agreed that the reports generated by the system are accurate and got an average mean of 4.26. Also, both the respondents agreed that all of the information in the system is up to date and got an average mean of 4.45. and lastly, the majority of the respondents agreed that the system's file can be easily recovered in case of a system failure got an average mean of 4.42. All in all, the functionality of the system got an average of 4.36 and that indicates that the system is reliable in times of misfortunate events.

Table 8: *Summary of Respondents Assessment on the proposed system in terms of performance.*

AREA	PRIMARY STUDENTS		COLLEGE STUDENTS		GENERAL AVERAGE	
	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation
1. The system responds well and produces information quickly without delay	4.52	SA	4.54	SA	4.53	SA
2. The page load speed does not cause any issues with the user's site experience	4.5	A	4.51	SA	4.5	A
3. The buttons are linked to the corresponding pages	4.5	A	4.53	SA	4.51	SA
4. All the pages are functional	4.53	SA	4.53	SA	4.53	SA
5. The system's database can hold a huge amount of data	4.46	A	4.5	A	4.48	A
COMPOSITE MEAN	**4.5**	**A**	**4.52**	**SA**	**4.51**	**SA**

Legend: Strongly Agree (SA), Agree (A), Fair (F), Disagree (D), Strongly Disagree (SD)

Table 8 shows that there are only a few differences between the general average of the assessment of the primary students and the college students in terms of the system's performance. The results of both the respondent are almost all in the strongly agree category which can be concluded that both the respondents are satisfied with the performance of the system. The ability of the system to respond well without delay got a general average of 4.53, the page load speed of the system got a general average of 4.50, the buttons redirect to the right page got an average of 4.51, the functionality or interactivity of the pages has a general average of 4.48, and the ability of the database to hold huge amount of data has a general average of 4.48.

Table 9: *Summary of Respondents Assessment on the proposed system in terms of supportability or security.*

AREA	PRIMARY STUDENTS		COLLEGE STUDENTS		GENERAL AVERAGE	
	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation	$\bar{x}$	Interpretation
1. The system is able to adapt to different types of devices (mobile or desktop) in which it is used	4.3	A	4.4	A	4.35	A
2. The system can be repaired easily and quickly in times of failure	4	A	4.5	A	4.25	A
3. The infrastructure of the system meets the requirements of the organization	4.29	A	4.51	SA	4.4	A
4. The system can be accessed by all the intended users after obtaining an account	4.5	A	4.53	SA	4.51	SA
5. The system can detect any duplicate data input that are expected to be unique	4.53	SA	4.53	SA	4.53	SA
COMPOSITE MEAN	**4.32**	**A**	**4.49**	**A**	**4.4**	**A**

Legend: Strongly Agree (SA), Agree (A), Fair (F), Disagree (D), Strongly Disagree (SD)

From Table 9, the general average of both the respondents falls under the agree side. Majority from the general average of the respondent's assessment are almost all average in which we can conclude that their expectations are met. The general average of the ability of the adaptability of the system has a general average of 4.35, the ability of the system to be repaired easily has a general average of 4.25, the system met the requirements of the organization has a general average of 4.40, the different users can access the system has general average of 4.51, the ability of the system to detect multiple data has a general average of 4.53

B. Summary of Findings

Table 10*: Summary of Weighted Mean for Primary Students*

CRITERIA	$\bar{x}$	INTERPRETATION
Functionality	4.25	Agree
Usability	4.51	Strongly Agree
Reliability	4.22	Agree
Performance	4.50	Agree
Supportability/Security	4.32	Agree

Table 10 shows the overall results of the survey conducted to the four (4) college students. The usability got the highest average mean of 4.51 because of the criteria of user-friendliness of the interface of the system, and the buttons/actions are present in the system with both having an average mean of 4.55 respectively. All functionalities received similar interpretations from the respondents.

Table 11*: Summary of Weighted Mean for College Students*

CRITERIA	$\bar{x}$	INTERPRETATION
Functionality	4.29	Agree
Usability	4.43	Agree
Reliability	4.51	Strongly Agree
Performance	4.52	Strongly Agree
Supportability/Security	4.49	Agree

Table 11 shows the overall results of the survey conducted to the ten (10) primary students. The reliability and performance aspect of the system got the highest average mean of 4.51 and 4.52 respectively. All functionalities received similar interpretations from the respondents.

IV. CONCLUSION

In this project, the main objective was to be able to contribute in one of the United Nations sustainable development goals of having quality education. In order for this to be accomplished, the group have developed DigiWiz, an Open-source Learning Platform for people to learn various subjects/topics based on the level of knowledge they need. The target age of users of the system ranges from 5 years old to 9 years old. The subjects offered by the system are General Science, Basic Mathematics, and Basic English. For this are the foundation that builds a child's knowledge. The group mainly used the programming language Django because it is easy to use, scalable, and reliable. The group decided to have at least 10 kids aging 5 - 9 to test the overall system to determine whether the system met its goal of giving quality education. The surveys that we have given to our subjects gave results of overall satisfaction. The software was presented on July 6 to three panels each giving an approval to the system. For that, we conclude that the general objective of the project was met.

V. RECOMMENDATIONS

Many different adaptations, tests, and experiments have been left for the future due to lack of time. For future works, the following ideas could be tested:

1. Increasing the age range of children who uses the system. That means more subjects should be offered for continuous assurance of giving quality education.

2. Upgrading the quiz module (Creating different types of quizzes, have more visualization, etc.) thereby making the system more engaging for the kids.

3. Improving the lesson module wherein some lessons can be viewed in a video format thereby helping the users of the software understand the lesson even more.

BIBLIOGRAPHY

Project Management Docs. (2019). Quality Management Plan Template - Project Management Docs. [online] Available at: https://www.projectmanagementdocs.com/template/project-planning/quality-management-plan/#axzz5ssxV7pvL [Accessed 6 Jul. 2019].

United Nations Sustainable Development. (2019). *About the Sustainable Development Goals - United Nations Sustainable Development*. [online] Available at: https://www.un.org/sustainabledevelopment/sustainable-development-goals/ [Accessed 6 Jul. 2019].