

Short Paper

Development of CLASSALI: An Online Learning Tool and Academic Performance Report for Makati Public Elementary Schools

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Abstract

Purpose – The main focus of the study is to develop an asynchronous framework ready for online classes of Makati Public Elementary Schools with Academic Performance Report to help users identify students at academic risk and adjust educational strategies



to meet student's academic needs. CLASSALI is equipped with five major features namely: (1) Virtual Classroom, (2) Online Quiz, (3) Grading System, (4) CLASSALI Forum, and (5) Data Analytics Reports.

Method – Researchers conduct an online assessment that has been tested by fifteen IT Practitioners and fifteen Non-IT Participants including admin, teachers, students, and parents. The data collected during the evaluation were computed for the analysis and efficiency of the system.

Results – The system gathered reviews mostly with “Excellent” remarks.

Conclusion – The system was found relevant nowadays since a new normal setting (i.e., pure online classes) due to the COVID-19 pandemic.

Recommendations – In the future analysis, some research points should be given more attention. First and foremost, the developed learning management system should be implemented in other schools in the Philippines. In the future to further examine the stability and generalization of the developed learning management system.

Practical Implications– It helps significant users such as teachers, school administrators, and parents rapidly identify students at academic risk and adjust educational strategies to meet students' needs.

Keywords – data analytics, classroom management, online learning tool, agile methodology

INTRODUCTION

Education acts as a platform for introducing people to every company, offering skills for the performance of everyday work, leisure, and inculcating morality for the good of individuals and communities. It is a platform on which younger generations recognize and engage in the past and make a major contribution to the growth and development of society.

Filipino parents value education as one of the most significant legacies they can offer to their children. Parents would work hard to be able to send their children to school at a very young age, where a child's early years are the foundation of his or her future development. Sharpening children's knowledge while they are in elementary school is a great start for them to be ready in the future. However, there are situations where it is impossible to work on.

Poor performance is one of the difficulties confronting students today, not only students but also teachers and parents who are their guides in carrying out any academic work. Poor performance has long-term consequences for both individuals and nations, when a large proportion of the population lacks the necessary skills, long-term economic growth in the country is severely compromised.

According to the Organization for Economic Co-operation and Development (OECD), they tested around 600,000 15-year-old students in 79 countries in the 2018 Program for International Student Assessment (PISA) (Juan, 2019). One in four students cannot complete even the most basic reading tasks. PISA results revealed that the Philippines ranks low in reading, science, math, global survey shows, it has an average reading score of 340, the lowest among the countries surveyed. This problem can affect the overall academic performance of a student.

As a result, the cause of the problem is that teachers and parents cannot distinguish the problem from the performance of their students at an earlier stage which results in the low academic performance of the students. The effect of the problem is when students enter the secondary level (High School) they often find it hard to grasp the concepts or solve the problems inside the classroom since they were not given adequate attention in the subject areas they lack during their primary level.

With the statement, the researchers perceived a better solution and strategy to solve the problem. The researchers proposed "The Development of CLASSALI: An Online Classroom Tool and Academic Performance Report for Makati Public Elementary Schools" the word CLASSALI is a two-word combination of CLASS means classroom and "SALI" or "KASALI" is a Tagalog word meaning to participate or join. Data Analytics Reports were added to CLASSALI to rapidly track the students' academic performance for easier evaluation.

OBJECTIVES OF THE STUDY

The general objective of the study is to develop and design an asynchronous framework ready for online classes of Makati Public Elementary Schools. The Academic Performance Reports are added to help users rapidly identify students at academic risk and adjust educational strategies to meet students' needs. The system incorporates five core features that serve as the foundation of the entire system as a whole.

First, the system covers a Virtual Classroom that served as a collaborative online space where teachers and students work together simultaneously. It is further broken down into several parts or sub-modules. These are as follows: a) *adviser scheduler* a fully functioning scheduler made for teachers, which allows them to control when and where various tasks take place; b) *attendance management* where teachers use the Auto-Present to produce attendance where unmarked students are present for easier monitoring. Attendance results can be exported via a range of file formats, such as XLS/.XLSX, PSV,

CSV, and Print. c) *class management* contains the process of creating and entering the classroom with the use of the access code d) *classwork management* contains all the study material that can be found in their designated topic created by the teacher.

Next, the CLASSALI Forum was designed to simply practice what the word connection implies. It is further broken down into several sub-features which cover different functions depending on the type of user. These are as follows: a) *Announcement Board Management* contains all the events in school created by the admin, this is intended for viewing only; b) *Parent Forum* allows teacher and parent to discuss students' performance and any other events c) *Class Forum* consists of teacher and student where they can freely discuss a certain topic regarding class works.

The Interactive Online Quiz is specifically made to give students brain workouts that measure the knowledge they have on a given topic. Furthermore, the Grading System will be based on the computed grades of the Department of Education (DepEd). This is the section where all the student's submitted class works are evaluated by the teacher. And here you can find the generated student grades for each subject. Sub-processes are a) *E-Class Record* list of student's raw score and total score of written works, performance tasks, and quarterly assessment. b) *CLASSALI Progress Report*- computation of grades per subject including 1st-4th grading. c) *CLASSALI Student Badge* to better represent student achievement based on the Department of Education grade scale descriptors.

Last is the Data Analytics Reports. It refers to the measurement, collection, analysis, and reporting of data on the progress of learners and the contexts in which learning takes place Sub-processes are: a) *Attendance Report*; b) *Class Work Report*; 3) *Periodical Subject Performance Report*; 4) *Quarterly Average Report*; c) *Online Quiz Score Report*; d) *Users Report*; & e) *Recommender System* based on the Department of Education suggestions and actions that will benefit the users.

REVIEW OF RELATED LITERATURE AND STUDIES

Philippine Government Agency for Basic Education and DepEd Commons

The Department of Education (DepEd) is the executive department of the government of the Philippines that is responsible for managing and governing the essential education system within the Philippines (Department of Education, 2015). The following step-by-step guidelines are the DepEd-based format used in primary schools. Since the system users are at the elementary level, the researchers used the DepEd format as the basis for the system's computation of grades and recommendations.

The DepEd Commons is an online educational platform produced by the Department for Public and Private School Teachers and Learners that facilitates distance learning (Department of Education, n.d.). DepEd Commons has used Quizizz as an Online Quiz. Quizizz is an online assessment platform that allows teachers and students to build and

use quizzes from one another. After supplying students with a unique access code, a quiz may be viewed live as a timed competition or used for homework within a specific timeframe. The Online Quiz in CLASSALI is based on Quizizz, however, researchers only restrict questions to multiple choices only because it is fast and simple for a grade school student to respond.

Advantages of Grading System

The Grading System is a good initiative and provides valuable advantages (Wilson, 2017). The advantages of this system include the following.

- 1) **Advance Grading Pattern** - It differentiates the grading system in the old times and today's pattern. Students today are assessed based on monthly assignments, objective and subjective tests, presentations, quizzes, and final papers.
- 2) **Identification of Weakness and Strengths** - This means that students can easily learn their lack of skills through the grades assigned to them per subject which will help them for the improvement of their overall performance.
- 3) **Easier Studies** – Those who just want to pass can simply make less effort to reach the passing grade. And those who want to score higher can divide the effort by task and easily achieve the overall target grade.

Steps for Computing Grades Based on DepEd

Learners from Grades 1-2 are graded on Written Works, Performance Tasks, and Quarterly Assessments every quarter. The three mentioned above are the given specific average weights that vary according to the nature of the learning area (Llego, 2020a). The following are the steps for computing:

1. Grades from all student work are added which results in the total score of each component, namely Written Work, Performance Tasks, and Quarterly Assessment.
2. The sum of each component is converted to the Percentage Score.

To calculate the Percentage Score (PS), divide the raw score by the highest possible score and then multiply the quotient by 100%. The following is shown:

$$\text{Percentage Score (PS)} = \left(\frac{\text{Learner's total raw score}}{\text{Highest Possible Score}} \right) \times 100 \text{ Equation 1}$$

3. Percentage scores are then converted to Weighted Scores to show the importance of every component in promoting learning within the different subjects.

The percentage score is multiplied by the weight of the component found in Figure 1 for Grade 1 to 10. The product is also known as the Weighted Score (WS).

	Components	languages	AP	EsP	Science	Math	MAPEH	EPP/TLE
1 to 10	Written Work	30%			40%		20%	
	Performance Tasks	50%			40%		60%	
	Quarterly Assessment	20%			20%		20%	

Figure 1. Weight of the components for Grade 1-10

Figure 1 above shows the weight of the components. The initial grade is the computed sum of the Weighted Scores in each component. The Initial Grade in CLASSALI Grading System is transmuted using the given transmutation table in Figure 2 to get the Quarterly Grade (QG).

Figure 2 illustrates the transmutation table. All grades are based on the weighted raw score of the learner's summary assessment. The minimum grade needed to pass a particular learning area is 60, which is transmuted to 75 within the report card. The lowest mark that may appear on the report card is 60 for Quarterly Grades and Final Grades.

Grade Computation at the End of School Year

The average of the Quarterly Grades (QG) produces the Final Grade.

$$FinalGradebyLearningArea = \frac{1stQG + 2ndQG + 3rdQG + 4thQG}{4} \text{Equation 2}$$

The General Average is calculated by dividing the sum of all final grades by the total number of learning areas. Each learning area has the same weight.

$$GeneralAverage = \frac{SumofFinalGradeofAllLearningAreas}{TotalNumberofLearningAreasinaGradeLevel} \text{Equation 3}$$

The Final Grade in each learning area and the General Average are reported as total numbers. Table 8 shows an example of the Final Grades of the different learning areas and the General Average of Grade 4 students.

Initial Grade	Transmuted Grade	Initial Grade	Transmuted Grade
100	100	100	100
98.40 99.99	99	66.40 67.99	79
96.80 98.39	98	64.80 66.39	78
95.20 96.79	97	63.20 64.79	77
93.60 95.19	96	64.60 63.19	76
92.00 93.59	95	60.00 61.59	75
90.40 91.99	94	56.00 59.99	74
88.80 90.39	93	52.00 55.99	73
87.20 88.79	92	48.00 51.99	72
85.60 87.19	91	44.00 47.99	71
84.00 85.59	90	40.00 43.99	70
82.40 83.99	89	36.00 39.99	69
80.80 82.39	88	32.00 35.99	68
79.20 80.79	87	28.00 31.99	67
77.60 79.19	86	24.00 27.99	66
76.00 77.59	85	20.00 23.99	65
74.40 75.99	84	16.00 19.99	64
72.80 74.39	83	12.00 15.99	63
71.20 72.29	82	8.00 11.99	62
69.60 71.19	81	4.00 7.99	61
68.00 69.59	80	0-3.99	60

Figure 2. DepEd Transmutation Table

Learners' Progress Report

The summary of student progress is shown quarterly to parents and guardians through a parent-teacher conference, in which the academic performance and other matters about the student are discussed. The portfolio can serve as tangible evidence of the learner's ability to perform the skills and competencies. The teacher will be able to determine whether or not the learners are capable of demonstrating knowledge and/or performing the tasks expected of learners using checklists. Teachers will be able to describe students' behavior, attitude, and effort in school work through anecdotal records or narrative reports.

Descriptor	Grading Scale	Remarks
Outstanding	90 – 100	Passed
Very Satisfactory	85 – 89	Passed
Satisfactory	80 – 84	Passed
Fairly Satisfactory	75 – 79	Passed
Did not meet expectations	Below 75	Failed

Figure 3. Descriptors, Grading Scale, and Remarks

Figure 3 shows the grading scale, with its corresponding descriptors. The Remarks are given at every end of the grading. When a learner's raw scores in Written Work and Performance Tasks consistently fall below expectations, the learner's parents or guardians must be notified no later than the fifth week of that quarter. This enables them to assist and guide their child in enhancing their performance and preparing for the Quarterly Assessment.

DepEd Guideline on the Learner Promotion and Retention

Figure 4 above shows the DepEd guidelines on the promotion and retention of learners under the K to 12 Basic Education Programme (Llego, 2019). A final grade of 75 or higher in all learning areas must be advanced to the next grade level.

REQUIREMENTS	DECISION
Final grade of at least 75 in all learning areas	Promoted to the next grade level
Did not meet expectations in not more than two learning areas	Must enroll in remedial classes for learning areas with failing mark and obtain a Recomputed Final Grade (RFG) of at least 75 or higher to be promoted to the next grade level or semester
Did not meet expectations in three or more learning areas	Retained in the same grade level
Passed all learning areas in the Elementary	Earn the Elementary Certificate and be promoted to Junior High School
Passed all learning areas in the Junior High School	Earn the Junior High School Certificate and be promoted to Senior High School

Figure 4. DepEd Learner Promotion and Retention

DepEd E-Class Record Template

These Electronic Class Record (ECR) models are given free of charge by the Department of Education (DepEd) for use by all public-school teachers. The models are used to determine grades compatible with DepEd Order No. 8, s. 2015, also known as the Classroom Evaluation Policy Framework for the K to 12 Basic Education Program (Llego, 2020b).

To ensure sustainability and minimize technical difficulties, the models developed have been streamlined using the basic features used in the spreadsheet file. User manuals are also provided to help instruct teachers about how to use the ECR models.

Figure 5. DepEd E-Class Record Template

Figure 5 shows the sample format on how the teacher records the activities of the students. It is a downloadable file. The researchers used this framework for the Grade Report to promote the collection of student grades from written works, performance tests, and quarterly evaluations.

Digital Badges: Creating Opportunities to Engage Learners

By implementing digital badges, individual learner’s achievements can be recognized and showcased through visual images. Educators can leverage this culture of recognition to increase student capacity, agility, and competitiveness while boosting student morale (Lambda Solutions, 2018).

Measuring Parent’s Involvement in Children’s Education

To draw attention to concerns related to assessing parental engagement in children's education. Researchers review the major assessment approaches used to date, highlighting both the strengths and weaknesses of each approach (Pomerantz & Monti, 2015). This is accompanied by recommendations for improving the assessment of parental engagement in three primary areas. First, pay more attention to ensuring the accuracy and biased validity of the time and cost-effective gather views in which parents, children, or teachers report on the usual involvement of parents. Second, outline how day-to-day and observational approaches can be used to discuss important conceptual and practical questions that have not been addressed. Third, consider determining how parents manage bridges, such as parent-teacher conferences, produced by schools to foster parents' participation.

Characteristics of Data Analytics

Data Analytics (DA) is the process of reviewing data sets to find trends and draw conclusions about the information they contain. Data analysis is used with the help of specialized systems and software. Data analytics technologies and techniques are widely used by businesses to inform them of their decisions (Rouse, 2017).

Data analytics activities will help businesses raise profits, improve efficiency, maximize marketing strategies, and improve customer experience. It can also be used to respond rapidly to market trends and to gain a competitive edge over rivals. However, the ultimate goal of data analysis is to boost business performance. Depending on the specific request, the data analyzed may consist of either historical records or new information that has been processed for real-time analysis. It can also come from a mix of internal systems and external data sources.

Integration of Online Learning Tool in the Philippines

The purpose of the integration of online learning tools in the Philippines to assist educators in becoming more effective and efficient in administering cost-free examinations, grading students, avoiding data and effort duplication, and providing accessible and reliable information about assessments and grades (Doctor, 2019), and providing educators and students with academic needs, particularly tracking learning progress (Urera, 2019). The advantage of a virtual learning environment system for learners is that it captivated and stimulated learners' imagination anytime, anywhere, using any device (Cofino, Atillo, & Velos, 2021). The acceptability of an innovative e-learning management system for transforming traditional methods into an ICT-based approach aims to improve the quality of education (Mauricio et al., 2017).

METHODOLOGY

Project Development

Figure 6 shows the following functions created using Agile methods. The following steps were carried out based on the Agile methodology.

1. Discussion

The first phase is the discussion where the proponents made judgments on what were the problems facing nowadays by collecting, analyzing, and deciphering the data needed to come up with the title and the system.

2. Design

After the discussion, researchers proposed the tools needed to achieve the objective of the project and defined the programming languages, frameworks, and libraries that the project used. These are as follows:

- JavaScript and PHP language for Web Application Development sped up the development because of the researcher's familiarization in both languages.
- HTML and CSS helped researchers in the web designing of the system.
- Adobe Illustrator helped researchers design the logos and other sections in the system.
- MYSQL helped researchers stored from a single record into an entire system.

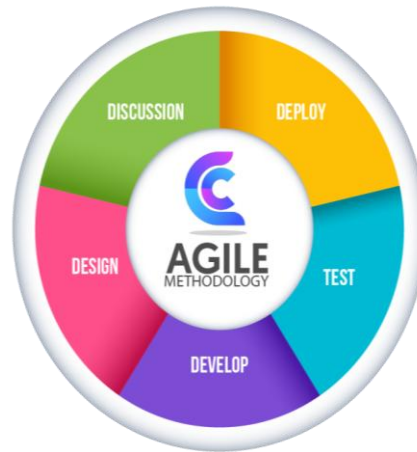


Figure 6. Agile Method

3. Develop

This phase is where the development of the system took place. At this stage, the outcome of the first and second phases was completed. Researchers needed MySQL (Relational Database Management System) for managing the data stored in the database. Security of the database prepared for injection or of the hacker that will come into the system. And for the scripting language, PHP, AJAX, JQUERY, and JavaScript are used for the runtime environment that automates the execution of tasks. The design of the system can be smoothed out with the support of JQUERY and JavaScript while the PHP and JQUERY languages focus on the web server request. The Virtual Classroom, the Interactive Online Quiz, the CLASSALI Forum, the Grading System, and the Data Analytics Reports are combined to create a platform where all processes in the traditional classroom can also be found to make work easier and more convenient.

4. Test

The fourth stage was testing. The researchers debug the potential outcome of the system as they use it. Ensure that no error is found and that the execution is perfect before installing it. To further test the functionality and works of the system, the researchers conducted an evaluation procedure that requires the participation of the users including Non-It and IT practitioners for evaluation of the system.

5. Deploy

The final phase is the deployment in which the system has passed all the tests and no problems encountered during the testing. As a result, the system is accessible to users and the real-world environment.

Conceptual Design

Figure 7 illustrates all the features of the entire system. The admin assigned an advisory class to the teachers in their respective schools, and the admin can also post an announcement to the virtual classroom for their school users. The assigned advisory class is managed by a teacher where all the classwork materials are posted and can be found in the virtual classroom. Students can join the class using the access code given by the teacher, students can now have access to the class and can now submit activities and online quizzes. While for parents, the access code can be found in line with their child/ or children's profile. The CLASSALI Forum is assigned to all users where all messages and announcements are posted. The grading system can be viewed differently depending on what type of user they are, but include all grades, teacher's comments per subject, etc. The Data Analytics is the same as the Grading System as the users see, but the functions are different. Data Analytics Reports include all graphic representations of the academic performance of each student, where suggested solutions or what we call the "Recommender System" on how to improve student performance are also identified.

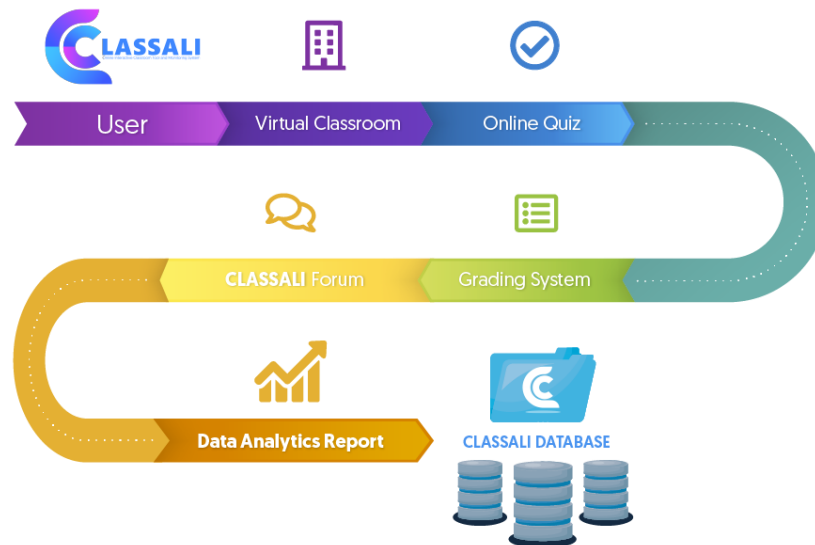


Figure 7. Conceptual Design

RESULTS AND DISCUSSION

Based on Table 1, In terms of functionality, the Non-IT respondents give a weighted mean of 4.6. According to respondents, using the Google API for the login makes the user log in with ease. Respondents also love the idea of Data Analytics in an LMS because the system is helping both learners and teachers in terms of evaluating student performance. The inputs are accurate to its functions, while the completeness and how its feature works in the system were considered excellent or highly acceptable. Performance Efficiency remarks were excellent with a weighted mean of 4.7. Respondents find that the system is capable of handling multiple users because the number of players in the system is four, including the teacher, parent, student, and administrator. In line with the system functions, the response time of each process is just right. When it comes to the security of the system, the respondents found it secured with the help of google authentication, and the system validates the input that the user will submit. The highest rates given by the respondents are 4.8 weighted means for the compatibility of the system with an excellent remark. Respondents found the system's compatibility in different browsers to be very efficient. Respondents found the system to be of great help to some parents and learners. Because parents can focus on their children especially in their school activities and the day-to-day tasks assigned to them. Respondents find the system easy to use and have a great UI and a nice color scheme that suits system users.

Table 2 shows the results of the IT respondent's evaluation. 4.6 are given for functionality, one of the respondents suggests that the system should have some functions while offline for those who don't have a consistent internet connection to access the system.

In terms of Security, Respondents suggest that researchers do error checking when it comes to entering data. To avoid double accounts or if there's a possible error for codes that need to be entered when it comes to forum/subject/meeting. If there's an error or there's already an existing account, it may have an error message pop-up. Nonetheless, the respondents give excellent remarks of 4.7 for Security.

Table 3 shows the overall summary of respondents to IT and non-IT. Here we can conclude that the NON-IT participants are satisfied with the rating scale they gave. The same with the IT participants, but the rating is moderate compared to NON-IT. The most promising indicator/module is the compatibility module and is in terms of efficiency.

Table 2. User Evaluation Summary of I.T. Professionals

INDICATORS	WEIGHTED MEAN	VERBAL INTERPRETATION
FUNCTIONAL SUITABILITY	4.6	Excellent
1. The system demonstrates completeness and works according to its features	4.6	Excellent
2. The system facilitates the accomplishment of specified tasks and objectives.	4.6	Excellent
3. The system is accurate when performing its functions	4.7	Excellent
PERFORMANCE EFFICIENCY	4.7	Excellent
1.The system is capable of supporting multiple users	4.7	Excellent
2. The response time of each system function indicates the appropriate speed.	4.7	Excellent
SECURITY	4.6	Excellent
1.The system ensures that only those authorized users can access the data	4.7	Excellent
2. The system validates the accuracy of the user input.	4.6	Excellent
RELIABILITY	4.7	Excellent
1. The system is operational and usable when it is needed for use.	4.7	Excellent
COMPATIBILITY	4.8	Excellent
1. The system performs the necessary functions while sharing the same software environment in different browsers.	4.8	Excellent
USABILITY	4.7	Excellent
1.The system is easy, efficient, and enjoyable (user-friendly) to operate	4.7	Excellent
2. The system defends users against error	4.7	Excellent
3. The system makes it easier for the user to enter and retrieve data	4.5	Very Good
4. The system is appropriate for the needs of users	4.7	Excellent

Table 3. User Evaluation Overall Summary of IT and NON-IT Professionals

INDICATORS	WEIGHTED MEAN (IT)	WEIGHTED MEAN (NON-IT)
Functional Suitability	4.6	4.6
Performance Efficiency	4.5	4.7
Security	4.7	4.6
Reliability	4.7	4.7
Compatibility	4.7	4.8
Usability	4.7	4.7

CONCLUSIONS AND RECOMMENDATIONS

Therefore, CLASSALI Development: Online Learning Tool and Student Performance Monitoring System for Makati Public Elementary Schools function academically and were successfully designed with the following features:

1. Virtual Classroom for student and teacher to connect in an academic environment
2. CLASSALI Forum for relaying information, important updates, and helping users address student academic performance concerns.
3. Online quiz to engage students in an online quiz in a fun way to learn at the same time.
4. Grading System for users to evaluate student learning and performance within the classroom.
5. Data Analytics for users to easily track student academic progress through graphic representation and suggestions based on DepEd on how to solve student academic performance.

The systems aforementioned were all successfully developed and tested, which means they have already proven to conform to the ISO 25010 quality standard based on the testing procedures for functional suitability, performance efficiency, security, reliability, compatibility, and usability testing.

CLASSALI was developed under the Agile methodology through the use of specific software frameworks and API. From this, we concluded that all the above-mentioned list of software or resources were successfully utilized by the researchers to develop the system. Both IT and NON-IT respondents evaluated the system. The system received an excellent rating based on the returned result from the respondents and with all the findings. The system is highly acceptable, functional, efficient, compatible, reliable, and

usable. This means that CLASSALI is widely accepted as an online learning tool, especially in a setting where it is impossible to have face-to-face classes like the one we have today when a pandemic strikes. CLASSALI is also able to easily identify the individual performances of students that will be of great help to users of Makati Public Elementary Schools, as they can know the areas that the student lacks and excel the most to immediately solve the problems if any.

RECOMMENDATIONS

With the developed project, it is proposed and recommended that such project be used and implemented by Makati Elementary Schools or even Elementary Schools outside the Makati which needs an alternative to existing learning management systems.

This study is not limited to the features presented in the developed CLASSALI: An Online Learning Tool and Academic Performance Reports for Makati Public Elementary Schools. In the future years of similar studies, the following enhancements are recommended by the researchers:

1. Log-in options – aside from Google authentication, also add accounts that users have nowadays like Facebook, etc. for the users to log in with ease.
2. Offline functions – other processes such as the Quiz for users, especially students who do not have a stable internet connection to respond to online activities.
3. Mobile Application Edition – it will be easier to build in a stand-alone environment for user convenience as mobile devices are hand-held and do not require a desktop or laptop.

IMPLICATIONS

The CLASSALI connects learning to something that the student is interested in, i.e., learning games that consider a student's quiz, assignments, and exams is a great activity to give students brain workouts. Build an engaging environment through the tools that young students are most familiar with today.

The implementation of Data Analytics in the CLASSALI online learning tool it is referred to the measurement, collection, analysis, and reporting of data on the progress of learners and the contexts in which learning takes place. It helps significant users such as teachers, school administrators, and parents rapidly identify students at academic risk and adjust educational strategies to meet students' needs.

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