Horace: A Digital Classroom Management Software for Computer Laboratories

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Abstract

Computer laboratories are met with tedious and time-consuming tasks. Significantly, these tasks affect students' learning curves. Therefore, this research aims to solve time-consuming, repetitive methods by developing digital classroom management software; Horace. A software evaluation survey was done. It is for teachers that are teaching non-computer-related subjects. On the software evaluation, the functionality ($\bar{x}$=3.15, σ=0.33) of the software gained the highest approval among the participants to be followed by efficacy ($\bar{x}$=3.11, σ=0.31), Usability ($\bar{x}$=3.08, σ=0.28), and Reliability ($\bar{x}$=3.05, σ=0.18). Moreover, all factors gained a descriptive interpretation of Agree. In conclusion, the software is effective and efficient in terms of their teaching in computer laboratories, assisting the teachers and the students in an effective transfer of knowledge towards achieving the desired goal and competencies.

Keywords
Digital Classroom, Classroom Management, Rapid Application Development (RAD) methodology, Social Sciences Statistical Program (SSSP)

1. Introduction
In traditional computer laboratory classes, despite the high technology, tedious, and time-consuming traditional classroom management styles still exist. These include the teacher going around the classroom for individual checking of attendance, student-activity monitoring, presentation of academic output in front of the class using traditional methods (like writing on the board, using Manila paper, and alike), and distribution of printed class content and modules (SmoothWall n.d.). The management of a computer-based classroom differs from a conventional classroom. Students' focus necessitates walking from one student to the next, which is exhausting and ineffective. This usually causes the majority of the students to lose interest or become indolent before the instructor is done with the other students (Farag 2018). Importantly, how teachers approach their classrooms strongly affects their students' chances of achievement. Effective classroom management is required to sustain acceptable student conduct and participation (Gage et al. 2017). Teaching effectively necessitates a diverse range of abilities. Teachers must provide instructions cleverly while efficiently maintaining classes to ensure student involvement and minimal disturbances.

Computer technology can improve educational content, but it isn't enough. The most challenging task is to ensure that new technology's advantages are correctly used (Singh 2021). Despite the widespread use of multimodal and multimedia means of expression outside the classroom, classroom appraisal activities focus on traditional print media rather than digital technology. If teachers want to utilize digital resources efficiently in the classroom, stronger links between ICT use in classrooms, contextual considerations, and analytical approaches are needed (Fjørtoft 2020).

Therefore, this research aims to produce classroom management software that will help facilitate presentation in computer laboratories. Additionally, this application will allow the maximization of computer laboratory devices and will further improve the presentation of class content.

1.1. Objectives

Specifically, its objectives are as follows:

1) To create a digital classroom management software that can: monitor and control multiple devices, support various devices, lock and switch off students' devices, capable of checking attendance, screen broadcast, and group teaching.
2) To enhance classroom participation through digital classroom management software.

2. Literature Review

The information system's soul is the computer room (Luo, et al. 2020). The school's computer labs are typical for students to access workstations, the interconnecting network, and other computers (Zapanta, Talirongan, and Talirongan 2021). The laboratory is the birthplace of scientific and technical progress. It is the cradle of knowledge, the foundation of scientific discovery (Aiyan 2017). The computer lab aims to assess students' computer and teaching abilities and develop the computer's capacity to function and build thought skills (Shi 2019).

The laboratory's construction standard represents the school's instructional, scientific, and management levels. In the days ahead, the laboratory's entire workforce would strive tirelessly to achieve the objective of establishing a first-class modern school (Aiyan 2017). Rapid technological advances in today's world have necessitated providing schools with the most up-to-date instructional technologies. The most challenging aspect of integrating technology into learning is encouraging students to use learning technology while maintaining a constructive and well-managed class (Gaber 2018). Effective classroom teaching and behavior intervention is needed to ensure student academic and social achievement. Even though foundational techniques like consistent goals and schedules, specific input, and high rates of opportunity to answer have good empirical support, they are often absent from educators' toolkits (Mitchell, Hirn, Lewis 2017).

According to Saifi et al. (2018), some teachers can approach classrooms in ways that positively affect students' achievement, but other approaches can hurt students' achievement. However, little is understood about how classroom management affects student outcomes depending on the classroom management style of the instructor.
A computer teacher should have a strategy in place to handle off-task or destructive student activity and recognize and reward exemplary behavior, attention, and work (AroundtheKamp Fire 2021).

Previous research has shown a connection between active time, appropriate learning experiences, high academic performance, and well-structured classrooms (Zianna et al. 2017). Hence, a mixture of classroom management tools, preparation, and computer lab rules would aid in the smooth running of lessons and create a positive learning experience for your students (Impero Software n.d.).

Computer lab work is done to reinforce the topic being tested, and its proper organization and execution significantly influence activation, inspiration, and, finally, training effectiveness. The inability of teachers to use computer simulations of physical phenomena to organize experimental studies is becoming one of the most challenging problems in implementing its findings in educational institutions (Omashova et al. 2017). Furthermore, the perceived creative organizational culture strongly impacts computer self-efficacy and indirectly affects teachers' continued use of e-teaching through computer self-efficacy. It can be inferred that by creating a creative organizational climate in schools and the teachers' computer self-efficacy, principals can regularly ensure that e-teaching is used in the classrooms.

In conventional computer laboratories, teachers must approach students to observe their progress, which is challenging to do from their computer through a network. Aside from that, some students can engage in resource and time waste by engaging in game-like activities. These problems show that conventional computer labs cannot provide the requisite teaching-learning experience that computer labs should provide (Dharmalingam 2019). Furthermore, current machine teaching techniques are too old and backward, the classroom material is not graphic enough, and students find it difficult to accept what they have experienced without the stimulus of precise details and vibrant picture knowledge (Shen 2021).

The management of a computer-based classroom differs from a conventional classroom. Students' independent focus necessitates walking from one pupil to the next, exhausting and ineffective. This usually causes the other students to lose focus or become idle before the instructor is finished with the other students. Computers often carry unforeseen technical issues that can distract students' attention and concentration away from the class's subject. The instructor would have to do the students' work with other teachers. Consequently, the teacher will waste a significant amount of time switching from one pupil to the next because not all students will get equal consideration from the tutor (Farag 2018). On the other hand, an instructor should be able to lead more than 60 students in the classroom. When students have questions about what they've heard, they want the instructor to provide a thorough answer. Since there are more students and class time is reduced, the teacher's responses often fall short of meeting the students' needs (Shi 2019).

Some problems arise inside the computer lab: (1) attendance keeping, which is kept in two ways during class hours. The first approach would be for the teacher to call out each student's name one by one and record attendance for those who answer. Keeping track of student attendance during lecture cycles has proven to be a challenging task. Since manual computing creates errors and consumes much time, the ability to compute the attendance percentage becomes a big challenge (Jacksi et al. 2018).

Even if they are not enrolled in the laboratory subject, any student may use the computer lab. Some take items from the laboratories, such as memory, mouse, keyboard, and alter the workstation's settings. Students that use the machine unit in the laboratory are not monitored or registered. There is no documentation for the last student consumer in a specific workstation, whether there is a faulty machine device or some such untoward loss or occurrence in the laboratory. (Zapanta, Talirongan, and Talirongan 2021).

(2) Audio-Visual aids, the projector performs better in light-low environments because the images are sharper and lighter. When you're in a classroom, this can be a drawback because you'll be tired and won't be able to take notes in the darkroom. Because creating a fully dark room is impossible, you won't get a good picture in the conference room, which is a disadvantage of using a projector (Electro Guides n.d.).

(3) Monitoring, it's challenging to keep a close eye on every student in a class. One of the leading causes of classroom distraction is a low level of student assessment. Teachers also struggle to keep track of student activities such as attendance, leaves, discipline, and assignments due to a lack of resources. Course management impacts the education industry if everything is done manually since producing coursework, projects, and exam papers for students takes much time and manual effort. Data lab curriculum in colleges and universities has gotten much coverage in recent years. The most fundamental prerequisite for improving the teaching efficiency of computer labs is to enhance the building and management of computer labs (Shi 2019).

Classroom management software keeps track of students' device usage in the classroom and allows teachers to see, handle, and track it. (Skarbeck 2019). Schools, learning centers, and educational institutions use classroom management software to increase classroom participation, inspire students, and improve student behavior and progress. Teachers and parents can better understand their student's progress and behavior by using classroom management software. It's a great way to get students involved in the learning process. The school's learning management system and student information system will benefit from the classroom management software. (Woofresh 2021).

A single instructor cannot constantly supervise and monitor the actions of all students in the lab. They are keeping an eye on them during practical sessions. The most challenging task is encouraging students to use learning equipment while maintaining a constructive and well-managed class. According to previous research, challenges in teaching computer Lab sessions involve losing classroom autonomy and student concentration, tracking Lab exams, and teaching visually disabled students (Utekar 2020).

The ability to communicate with students and teachers is one of the most significant features that drive the classroom management software market. If a student requires extra attention in class because he or she struggles to grasp a concept, professors may use classroom management techniques to communicate with students one-on-one and provide customized teaching tailored to the student's needs. Educators would use classroom management tools to interact with students in groups. Similar to the management software created by Uterak et al. (2020), the faculty can access the server system by using their credentials, and the same students can also access the client system using their credentials. When the student logs in their subject name, practical lists, will be provided in this module & once they finish with their assigned task, they have to upload a file of practical work to the faculty's module. After analyzing the outcome, the faculty can now fetch students' submitted document files, and the attendance will be marked by faculty; after that excel file will be created of attendance for faculty.

Also, some features of Classroom management software are the following: a. the use the thumbnail tracking feature in the classroom to see what the students are doing during class hours; b. Monitoring - Teachers can quickly check student progress, engage in face-to-face teaching, and interact effectively without disrupting the class with device disruptions thanks to real-time computer tracking; c. Private chatting; d. Internet safety (Woofresh 2021); e. Monitoring of browser tabs on student monitor; f. limit the use of the device during examinations (Smoothwall n.d.)

The laboratory management scheme raises the bar regarding laboratory management and resource use. Furthermore, it is more practical and accessible for teachers and pupils (Wang 2016). According to the study of Gaber (2018), overall, the Classroom Management Software (CMS) tool successfully enhanced the E-learning environment and students' results, according to the assessment. About 90% of respondents agreed that the CMS improves the learning experience by allowing teachers to manage, track, and interact with the whole class from a single computer. All of the respondents expressed gratitude for the practice and affirmed its usefulness. Finally, compared to the placebo group, the study group's grades improved. According to the results report, there was a notable improvement in student success of around 20% in the experimental sample.

Overall, according to the assessment, Farag (2018) concluded in his study Computer Laboratory Teaching Management System for Improving Teaching and Learning that the CMS tool can enhance the teaching delivery process. It improves student participation, teacher-to-student contact, and flip teaching effectiveness. It assists the instructor in demonstrating, communicating with students via chat sessions, and keeping students on track. It is ideal for saving time, reducing teachers' workload, allowing community learning and teamwork, and promoting information sharing. Students can also interact with the teacher without disrupting the rest of the class. It is proposed that the computer lab management structure be expanded to all disciplinary laboratories and that the I.T. management department manages all laboratories.

3. Methodology

3.1. Project Design

Rapid Application Development (RAD) is a methodology that prioritizes quick progressive development of prototypes using the gathered feedback during testing cycles. With RAD, fragments of the planned software will be rapidly made and be tested by the respondents to see which prototype fits the best on the final software. Finally, with the approved prototypes and the gathered feedback from the clients, the researchers will now be able to finalize the software.

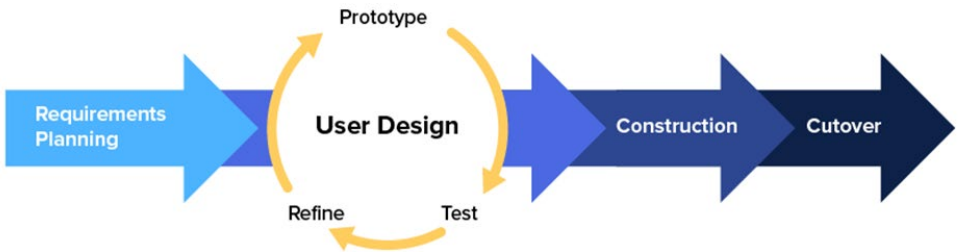

Figure 2. Rapid Application Development (RAD) methodology

3.1.2. Rapid Application Development (RAD)

The Rapid Application Development methodology has four (4) phases that require proper connection with the respondents, designing UI/UX, and coding mastery to be in accord with the desired application.

3.1.2.1. Define the Requirements

The first phase requires the respondents to give the researchers a broad idea of the desired application. The broadness of the requirements will help the researchers determine the application's scope. And in the long run, the researchers will be able to identify solutions that are yet to be apparent given the knowledge that was provided.

3.1.2.2. prototype

The second phase starts the rapid development of the prototype in relevance with the initial requirements of the application. The prototypes will mainly prioritize the presentation of the suggested feature and will not reference the final product; approved prototypes will be kept and be further improved.

3.1.2.3. Receive feedback

In the third phase, the researchers used the evaluators' feedback about the prototypes to improve the software further. Feedbacks are not only limited to functionalities but also visuals and interfaces.

3.1.2.4. Finalize software

Finally, the researchers finalize the application with the compiled approved fragments of the desired application.

The Rapid Application Development methodology allows adaptive modification on the application. This prevents sudden significant changes in the application's features during the final stages that heavily burden the researchers. With RAD, the researchers will focus on improving and preparing the application for deployment.

3.2. Population and Locale of the Study

3.2.1. Population

The researchers aim to focus on computer laboratories for gathering information. Specifically, computer laboratories are facing problems with the presentation of class contents and management of the class. The study's respondents are teachers who use the computer laboratory for their subjects aside from computer teachers. A total of twenty (n=49) school administrators and teachers were the study's respondents.

As shown in table 1, there are forty-nine (n=49) participants in the survey study. There are thirty-six (36) female participants and thirteen (n=13, 26.5%) male participants.

Table 1. Gender of participants on the survey.

Gender	**Frequency**	**Percentage**
Female	36	73.5
Male	13	26.5
Total	**49**	**100.0**

Table 2 presents the participants per department on the survey. There were twenty-three (n=23, 46.9%) teaching in the Junior High School department, fifteen (n=15, 30.6%) coming from the Senior High School department, ten (n=10, 20.4%) coming from the Grade School department, and one (n=1, 2.0%) teaching both in the Junior and Senior High School department.

Table 2. Participants per department on the survey

Department	**Frequency**	**Percentage**
Grade School	10	20.4
Junior High School	23	46.9
Junior High School and Senior High School	1	2.0
Senior High School	15	30.6
Total	**49**	**100.0**

Table 3 displays the subject taught by the participants. There were nine (n=9, 18.4%) who were teaching English, six (n=6, 12. 2%) were generalists from the elementary department and Christian Living Education, and Social Science respectively, five (n=5, 10.2%) were teaching Computer and General Mathematics separately, four (n=4, 8.2%) were teaching Technology and Livelihood Education, three (n=3, 6.1%) were teaching Science, two (n=2, 4.1%) were teaching Filipino and MAPEH correspondingly; lastly one (n=1, 2.0%) was teaching research.

Table 3. Participants per subject taught on the survey

Department	**Frequency**	**Percentage**
All Subjects	6	12.2
Christian Living Education	6	12.2
Computer	5	10.2
English	9	18.4
Filipino	2	4.1
General Mathematics	5	10.2
Music Arts, Physical Education, and Health (MAPEH)	2	4.1
Research	1	2
Science	3	6.1
Social Science	6	12.2
Technology and Livelihood Education	4	8.2
Total	**49**	**100.0**

3.2.1. Locale

The study was conducted at St. Rose Catholic School, Inc., located at Poblacion Sur, Paniqui Tarlac. School administrators and teachers utilizing the computer laboratory for their classes were the study's respondents.

4. Data Collection

4.1. Data Instrumentation

The researcher had the program evaluated twice to create a digital classroom management software. First, to evaluate the usability and effectiveness of the prototype software, the researchers floated a survey questionnaire to the teacher participants. The study adopted the ISO/IEC 25010:2011 or ISO desktop application evaluation (2011) tool. However, instead of using the six (6) factors, namely: (1) Functionality; (2) Reliability; (3) Usability; (4) Efficiency, (5) Maintainability, lastly, (6) Portability in the survey, only Functionality, Reliability, Usability, and Efficiency was evaluated for the survey.

The survey questionnaire used a four (4) point Likert scale system rating with four as the highest and one as the lowest. Through the provided ratings of the Likert scale, the respondents can respond with their level of agreement or disagreement ranging from the possible responses typically included "strongly agree", "agree", "disagree", and "strongly disagree". Each item on the questionnaire contains a four-point scale shown as follows:

4 – Strongly Agree
3 – Agree
2 – Disagree
1 – Strongly Disagree

4.2. Data Analysis

The Quantitative data gathered and collected through the survey questionnaires were analyzed using descriptive statistics through the support of the Social Sciences Statistical Program (SSSP). The information from each item on the survey questionnaires was extracted by the computation of its mean and standard deviation via the four-point grading scale, which is the standard for research. The interpretation of the scale is shown as follows:

4.00-3.26– Strongly Agree
3.25-2.51- Agree
2.50-1.76- Disagree
1.75-1.00- Strongly Disagree

5. Results and Discussion

Table 6 shows the functionality of the software. Four (4) statements got the mean rating of 3.15 (σ=0.33) with the descriptive rating of "Agree". The statement "The software can perform the tasks required" got the highest mean rating of 3.33 (σ=.474) with the descriptive rating of "Strongly Agree", and statements "The software can interact with another system" and "The software can prevent unauthorized access" got the lowest mean rating of 3.06 (σ=.242) respectively with the descriptive rating of "Agree".

Table 6. The functionality of the software

Statements	Mean	Std. Deviation	Interpretation
The software can perform the tasks required	3.33	0.474	Strongly Agree
The result of the software is as expected	3.18	0.391	Agree
The software can interact with another system	3.06	0.242	Agree
The software can prevent unauthorized access	3.06	0.242	Agree
Mean and standard deviation per factor and descriptive rating	**3.15**	**0.33**	**Agree**

The reliability of the software is shown in table 7. Three (3) statements got a mean rating of 3.05 (σ=0.18) with the descriptive rating of "Agree". The statement "The software is capable of resuming work and restores lost data after a failure" got the highest mean rating of 3.10 (σ=.306) with the descriptive rating of "Agree" and "There are no faults or bugs in the software" got the lowest mean rating of 3.00 (σ=.000) with the descriptive rating of "Agree".

Table 7. The reliability of the software

Statements	Mean	Std. Deviation	Interpretation
There are no faults or bugs in the software	3.00	.000	Agree
The software is capable of handling errors	3.06	.242	Agree
The software is capable of resuming work and restore lost data after a failure	3.10	.306	Agree
Mean and standard deviation per factor and descriptive rating	**3.05**	**0.18**	**Agree**

In table 8, participants rated the usability of the software. Four (4) statements got an overall mean rating of 3.08 (σ=0.28) with the descriptive rating of "Agree". Statements "The user learns to use the system easily" and "The user uses the system without much effort" got the highest mean rating of 3.10 (σ=.306) with the descriptive rating of "Agree". However, the statement "The user knows how to use the system" got the lowest mean of 3.08 (σ=.277) with the descriptive rating of "Agree".

Table 8. The usability of the software

Statements	Mean	Std. Deviation	Interpretation
The user knows how to use the system	3.06	.242	Agree
The user learns to use the system easily	3.10	.306	Agree
The user uses the system without much effort	3.10	.306	Agree
The system interface looks good	3.08	.277	Agree
Mean and standard deviation per factor and descriptive rating	**3.08**	**0.28**	**Agree**

The efficacy of the software's results is seen in table 9. Two (2) statements got an overall mean rating of 3.11 (σ=.031) with the descriptive rating of "Agree". The statement "The system quickly responds" got the highest mean rating of 3.14 (σ=.354), and "The system utilizes resources efficiently" got the lowest mean of 3.08 (σ=.277) with the descriptive rating of "Agree" respectively.

Table 9. The efficacy of the software

Statements	Mean	Std. Deviation	Interpretation
The system quickly responds	3.14	.354	Agree
The system utilizes resources efficiently	3.08	.277	Agree
Mean and standard deviation per factor and descriptive rating	**3.11**	**0.31**	**Agree**

Table 10 presents the summary per factor of the survey. Functionality got the highest mean rating of 3.15 (σ=0.33) with the descriptive rating of "Agree". However, reliability got the lowest mean rating of 3.05 (σ=0.18) with the descriptive rating of "Agree".

Table 10. Summary per factor on the software evaluation survey

Factors	Mean	Std. Deviation	Interpretation
Functionality	3.15	0.33	Agree
Efficacy	3.11	0.31	Agree
Usability	3.08	0.28	Agree
Reliability	3.05	0.18	Agree

6. Conclusion

With the advancement of technology, school computer laboratories and computer teachers must also catch up with its fast-phasing changes. Amidst the pandemic, video conferencing sites (e.g., Zoom and Google meet) have become a household name. Different software features like share screen, private chat, whiteboard, mute, etc., are helpful tools in video conferencing sites. As face-to-face classes are being slowly implemented in some areas with low cases of Covid-19, these software features must also be adapted in computer laboratories for a better learning experience.

Horace aims to provide efficient computer laboratory management software to effectively enhance the students' learning experience and teachers' pedagogies. Based on the respondents' evaluation in terms of functionality, reliability, usability, and efficacy, it was evaluated effective and efficient by the teacher-respondents.

First, the functionality of the software gained the highest mean rating. According to Moumane et al. (2016), functional correctness is defined as the output being identical to the input with a possible minor mistake. With the rise of big data, the web environment, and cloud computing, efficiency and accuracy difficulties in data processing have become a key concern for software functionality services (Norzaidi, Chong, Salwani, and Lin 2016). The program Horace has shown high functionality among the respondents in terms of performing the tasks required, showing the result as expected, interacting with another system, and can prevent unauthorized access.

Second, efficiency has typically been defined in the context of software development as the ratio of functionality, measured in lines of code or function points, to effort invested (Chinubhai 2016). According to the respondents, Horace quickly responds and utilizes resources efficiently. Improved efficiency results in increased production, shorter product life cycles, reduced time to market, and, eventually, a higher bottom line (Kumar 2020).

Third, based on the respondents, the usability of the software management system overall interface looks good, enabling the respondents to know how to use the system quickly and without much effort. A programmer's quality-oriented mindset implies that they should always consider methods to improve the software's quality. A developer must be user-oriented. They must constantly think about user needs to attain an appropriate quality of software (Uddin, Azeem and Anand, Abhineet 2019).

Lastly, software reliability refers to the chance of software operating without failure for a certain amount of time in a specified environment. Reliability estimate enables the determination of the number of losses that occur over a particular period, the mean life of software, and the primary cause of failure, among other things (Uddin, Azeem and Anand, Abhineet 2019). The management software showed no faults or bugs in the software, that it is capable of handling errors, and that it is capable of resuming work and restoring lost data after a failure.

Based on the respondents' evaluation, the management software is effective and efficient in terms of their teaching in computer laboratories. According to the respondents, functionality, reliability, usability, and efficiency of the software are essential, especially with the advancement of technology. The computer laboratory management software will assist the teachers and the students in an effective transfer of knowledge towards achieving the desired goal and competencies.

References

Aiyan, L., Research on the Computer Laboratory in Practical Teaching in the University - Take an Example of Pearl River College. *International Journal of New Developments in Engineering and Society*, Vol.1, No.3, 2017.

AroundTheKampfire.com., Manage Your Computer Lab Like A Boss! Classroom Management for Technology Teachers. Available: https://aroundthekampfire.com/2017/06/school-computer-lab-classroom-management.html, 2021.

Chinubhai, A., Efficiency in Software Development Projects, 2016.

Classroom Management Resource Guide., Classroom Management Strategies Resource Guide. http://schoolofeducators.com/wp-content/uploads/2017/09/ClassroomManagementStrategies.pdf, 2017.

Dharmalingam, R., Problems in the computer laboratory: An effective method of monitoring student activities and delivering multimedia content https://www.researchgate.net/publication/331635457_Problems_in_the_computer_laboratory_An_effective_method_of_monitoring_student_activities_and_delivering_multimedia_content_R_D_S_Kumar_and_D_Ramalingam_319, 2019.

Electro Guides., What are the Advantages and Disadvantages of Projector? https://electroguides.com/what-are-the-advantages-and-disadvantages-of-projector/#:~:text=disadvantages%20of%20projectors.-,Dark%20Room,take%20notes%20in%20the%20darkroom, n.d.

Farag, S. G., Computer Laboratory Teaching Management System for Improving Teaching and Learning. *International Journal of Online Engineering (iJOE)* 14(09):182, 2018.

Fjørtoft, H., Multimodal digital classroom assessments. https://www.sciencedirect.com/science/article/pii/S0360131520300919#kwrds0010, 2020

Gaber, S., Computer Laboratory Teaching Management System for Improving Teaching and Learning. September 2018, *International Journal of Online Engineering (iJOE)* 14(09):182, 2018.

Gage NA, Scott T, Hirn R, MacSuga-Gage AS., The Relationship Between Teachers' Implementation of Classroom Management Practices and Student Behavior in Elementary School. Behavioral Disorders. 2018;43(2):302-315. doi:10.1177/0198742917714809, 2018.

Imperosoftware.com., 5 classroom management tips for computer labs. Available: https://www.imperosoftware.com/uk/blog/5-classroom-management-tips-computer-labs/, n.d.

ISO/IEC 25010:2011 Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models. https://www.iso.org/standard/35733.html, n.d.

Jacksi, Karwan & Mohammed, Falah and Zebari, Shahab., Student Attendance Management System. *International Journal of Engineering and Technology*. 6. 49-53. 10.21276/sjet.2018.6.2.1.,2018.

Kumar, M., 7 Metrics for Improving Software Engineering Efficiency and Productivity. Retrieved from *parkardigital*: https://parkardigital.com/software-engineering-metrics/, 2020.

Luo, J., Yuan, M., Lai, Z., Sun, Y., and Chen, T., Design and research of computer room communication system based on electronic information technology. *Journal of Physics*: Conference Series 1650 (2020) 022066 IOP Publishing. doi:10.1088/1742-6596/1650/2/022066, 2020.

Mitchell, B., Hirn, R., Lewis, T., Enhancing Effective Classroom Management in Schools: Structures for Changing Teacher Behavior. https://journals.sagepub.com/doi/abs/10.1177/0888406417700961, 2017.

Moumane K, Idri A, Abran A., Usability evaluation of mobile applications using ISO 9241 and ISO 25062 standards. *Springerplus*, 2016.

Norzaidi MD, Chong SC, Salwani MI, and Lin B. The indirect effects of intranet functionalities on middle managers' performance: Evidence from the maritime industry. *Kybernetes*, 2016;40(1-2):166-181, 2016.

Omashova, G., Spabekova, R., Kabylbekov, K., Saidullayeva, N., Saidakhmetov, P., and Djunusbekova, S., Management and organization of computer laboratory work in physics education. https://www.revistaespacios.com/a17v38n45/a17v38n45p35.pdf, 2017.

Saifi, I. L., Hussain, M., Salamat, L., and Bakht, I., Impact of Classroom Management on Students Achievement at University Level. *Asian Innovative Journal of Social Sciences and Humanities*, 2(2), 13-27, 2018.

Shaha, V., Arabhavi, A., Barage, C., Chavan, S., Karande, Y., and Kelkarb B., "Remote Lab Monitoring", *IRJET*, Volume: 03 Issue: 03, 2018.

Shen, Y., Research on Network Management of Computer Laboratory Equipment and Experimental Teaching in Colleges and Universities Based on Big Data. *Journal of Physics*: Conference Series 1744 (2021) 042067, 2021.

Shi, Guoxing., Research on Computer Lab Management Mode based on Internet of Things. *Journal of Social Sciences Studies*, Volume 4, ISSN: 2664-0287, 2019.

Singh MN., Inroad of Digital Technology in Education: Age of Digital Classroom. Higher Education for the Future. 2021;8(1):20-30. doi:10.1177/2347631120980272, 2021.

Skarbeck, M., What is Classroom Management Software? https://www.dyknow.com/blog/what-is-classroom-management-software/, 2019.

SmithSystem., Computer Labs: Dead or Just Dying for Modern Makeover? https://smithsystem.com/smithfiles/2015/09/15/computer-lab-design-modern-makeover/, 2020.

Smoothwall., Classroom Management Technology. https://cdn2.hubspot.net/hubfs/4139239/US-Website-Assets/Whitepapers/US-Smoothwall-ClassroomManagementTechnologyWhitePaper.pdf, n.d.

Uddin, Azeem & Anand, Abhineet., Importance of Software Testing in the Process of Software Development. 2321-0613, 2019.

Utekar, S. Panda, S., Khopade, T., Manjarekar, K., and Patil, S., Computer Laboratory Management System for Improving Teaching & Learning Methods. *International Research Journal of Engineering and Technology (IRJET)* e-ISSN: 2395-0056 Volume: 07 Issue: 02, 2020.

Wang, F., The Design of Public Computer Lab Management System Based on Network Environment. *International Conference on Education, Management and Computer Science* (ICEMC 2016), 2016.

Woofresh., the 10 Best Classroom Management Software. https://woofresh.com/classroom-management-software/, 2021.

Zapanta, D., Talirongan, H., and Talirongan, F., Access Control and Monitoring: A System for Computer Laboratory. *Mediterranean Journal of Basic and Applied Sciences* (MJBAS) Volume 5, Issue 1, Pages 18-27, 2021.

Zianna. E. D. G, A. P. C, Juan. P.V. V, Gerome M. R, Coleen. S. C. S, Ryan R. G., Coleen. S.S and Ryan. R.G., Computer Laboratory Management with Mobile Application (CLMMA). *International Journal of Advances in Electronics and Computer Science*, ISSN: 2393-2835 Volume-4, Issue-1, 2017.

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