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SkillSync: A Web-based System for Managing Trainers' Workload, Trainee's Progress and Training Programs of RMMC STVET

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ABSTRACT

Technical Vocational Education and Training (TVET) institutions require an efficient system for managing trainer workloads, trainee progress, and training program information, but many continue to utilize manual or paper systems that result in disorganized records, limited monitoring capabilities, and delays in decision-making. Therefore, the purpose of this study was to design, develop, and evaluate a web-based training management system, SkillSync, to be implemented at Ramon Magsaysay Memorial Colleges, School of Technical Vocational Education and Training (RMMC-STVET). The research design was a combination of developmental and descriptive-evaluative research. SkillSync was developed through system development requiring data collection, testing, and piloting with administrators, trainers, and trainees using a survey, and the System Usability Scale (SUS) was utilized to evaluate the system. The data collected provided evidence that SkillSync is effective in supporting the management of training data and has improved the accessibility and organization of training data significantly. The SUS total score of 86.0 indicates an extremely usable system with a very high level of user satisfaction. Results also indicated that the users were highly accepting of the system by all stakeholders who were part of the evaluation process. In summary, SkillSync is a functional, user-friendly tool that can make a significant improvement in the efficiency of managing training and supporting decision-making for technical vocational education and training (TVET). SkillSync has demonstrated that web-based technology can enhance the administrative functionality of TVET institutions and promote the digital transformation of the administrative functions of TVET institutions.

Keywords: training management system; technical vocational education; usability evaluation; web-based system; trainee progress tracking

INTRODUCTION

Technical-Vocational Education and Training (TVET) helps to create relevant and necessary skills for individuals to possess to work in a variety of industries (TESDA A, 2022). In order to manage training effectively, it is important for provider institutions to track the progress of each student; to maintain a record of all training sessions completed by each instructor; to schedule both instructors and students appropriately; and to record attendance for each instructor and each student. There are many TVET providers that still rely on paper-based or manual systems of management; such reliance creates a great deal of inefficiency as the size of training programs and the collection of data grow. This makes it more challenging to have accurate and reliable records of trainees and trainers (TESDA B, 2022).

Research indicates that by centralizing the data and allowing for real-time access, as well as having tools for monitoring performance, educational institutions can provide better management of education through the use of digital information systems. According to both (Kalaghatagi & Eligar, 2022; Salleh, 2020), web-based systems provide better decision-making capabilities; they help eliminate administrative burdens through providing organized information that is easily accessible. Although there are many benefits in using a digital information system, many educational institutions continue to rely on manual processes. This could be because

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they are used to using that method, budget constraints, or a lack of technical capabilities for a digital system. Using a manual information system may work in a small-scale format, but once the demand for educational services increases, using a manual system will decrease efficiency and scalability with the demand for student achievement.

Ramon Magsaysay Memorial Colleges - School of Technical Vocational Education and Training (RMMC STVET) has used a number of different methods, including many manual and semi-digital systems, to manage the training process. These very different systems do not provide consistency in the maintenance of records, nor allow for efficient retrieval of data, nor assist in creating reports. As training programs increase in size, managing trainee records and tracking trainee performance becomes increasingly complex and impacts both administrative efficiency and decision-making.

The research explores the integration of all areas for managing training into a centralized digital system as a way to improve the efficiency, accuracy, and accessibility of information. The research further believes that if a web-based system is user-friendly and meets the requirements of the institution, then the user will be able to adopt that system as an effective solution. Based upon these assumptions, this research presents SkillSync, which is a web-based system that provides a central repository for all training information, manages trainer workloads, and provides the capability to manage and plan training programs.

SkillSync is important because it contributes to both the education sector's and institutional performance through its ability to create and manage skill-based training with accuracy when used correctly (Stolte, 2022). Digital systems allow for the ability to monitor activities in real-time, generate structured reports that reflect data accuracy, and be utilized for data-driven decision-making. The goal of this research project is to show that SkillSync can help manage skills training programs and assist Ramon Magsaysay Memorial Colleges Inc. – School of Technical-Vocational Education and Training (RMMC), regionally located in General Santos City, Philippines, in their efforts to become an innovative model for vocational education through the implementation of a digital system for Vocational Education digital transformation initiatives of education.

THEORETICAL/CONCEPTUAL FRAMEWORK

The basis of this research study is Information Systems Theory for understanding the uses of digital technology in growing organizations and the evaluation of usability for assessing the performance of the system. Through the use of an information system, organizations can effectively store, administer, and process large amounts of data that help improve decision-making capabilities. SkillSync is built upon systems that connect trainers' and trainees' training histories, trainer workload management, and trainees' performance into an integrated digital platform. SkillSync organizes "raw" data into valuable/retrievable information that supports better management of education through effective administration and improved decision-making.

Usability of a system plays a major role in assessing the usability and effectiveness of a software application. A proper functional system must also be intuitive, or not very difficult to use and navigate. Usability evaluation was assessed in this research project using the System Usability Scale (SUS), which allows for an evaluation of how well the user feels satisfied with using the system, how easily a user can use the system, and how well the user believes the system performed. An increase in usability will lead to a greater chance of user acceptance and provide an effective means to support the processes of the institution and the management of training programs.

This determination is supported by the conceptual model used here and is known as the Input–Process–Output (IPO) Model to describe both the development and evaluation of SkillSync. The first element refers to training management data such as current workload for trainers, progress of trainees, and details of training programs. The next element refers to the various design, development, implementation, and evaluation processes involved and includes user surveys and System Usability Scale (SUS). The final element is that SkillSync has produced a web-based training management system, which will provide improved efficiency, organization, and monitoring of your school's training program.

The conceptual framework defines how the processing of training data through established systems is transformed into valuable outputs that can be utilized to better manage training. Application of the information

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system principle, usability evaluation, and systems development process principles demonstrates the basis on which SkillSync provides an efficient process of administration and supports education and training decisions with data in technical vocational education and training.

Statement of the Problem

The objective of this research was to establish and evaluate SkillSync, a web-based training management system that was created to manage trainer workload, track trainee progress, and organize training programs for Ramon Magsaysay Memorial Colleges - School of Technical Vocational Education and Training (RMMC STVET). The study was to assess both the efficiency of the SkillSync system in supporting training management processes, as well as how usable the SkillSync system was and how acceptable the system was for administrators, trainers, and trainees.

Specifically, it sought to determine the:

(1) efficiency of the SkillSync system for managing trainer workload, trainee progress, and training program;

(2) overall usability of the SkillSync system according to the System Usability Scale (SUS); and

(3) overall acceptability of the SkillSync system as a tool for providing effective and accurate training management.

METHOD

For this research, a developmental and a descriptive-evaluative research design were used for the design, development, and evaluation of SkillSync, which is a web-based training management system for Ramon Magsaysay Memorial Colleges - School of Technical Vocational Education and Training (RMMC STVET). The use of a developmental approach helped direct the development of the system. This included the analysis, design, development, testing, and implementation of the system. The use of a descriptive-evaluative approach evaluated the usability and effectiveness of the system based on user experience and user feedback.

The sample of respondents includes administrators, trainers, and trainees from RMMC STVET who have used and interacted with the system during its implementation. Those selected users were chosen based on the fact that they were the main stakeholders involved in the training management processes. The data provided by these users based on their interactions with the system allowed the evaluators to assess the functionality, usability, and overall effectiveness of the system as it was designed to be used in the training management process.

User survey questionnaires and the System Usability Scale (SUS) were utilized to gather data. The user survey was used to assess user perceptions regarding functionality, performance, and overall usefulness of the system as it relates to managing training information. The System Usability Scale was used to measure system usability based on ease of use, learnability, and user satisfaction. After using the system, the respondents completed the survey instruments.

The creation of SkillSync went through a systematic process, which included an analysis of the needs of the end user in terms of training management to perform a systems analysis; designing the structure of the systems by developing the architectural design and the functional design; developing the system through the development of the system using web-based technology; and testing the system prior to installation. Once the system was installed and accessible to users, users completed their tasks, which included tracking progress, managing the schedule, updating records, and completing evaluation tools.

The descriptive statistics were used to organize, tabulate, and analyze the data collected. The scores on the System Usability Scale (SUS) were determined using the standard scoring procedure for each question and result. The data was also interpreted to provide an evaluation of the success of the system and the degree of user acceptance in facilitating the processes associated with training management.

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Design of the System

System Architecture of SkillSync

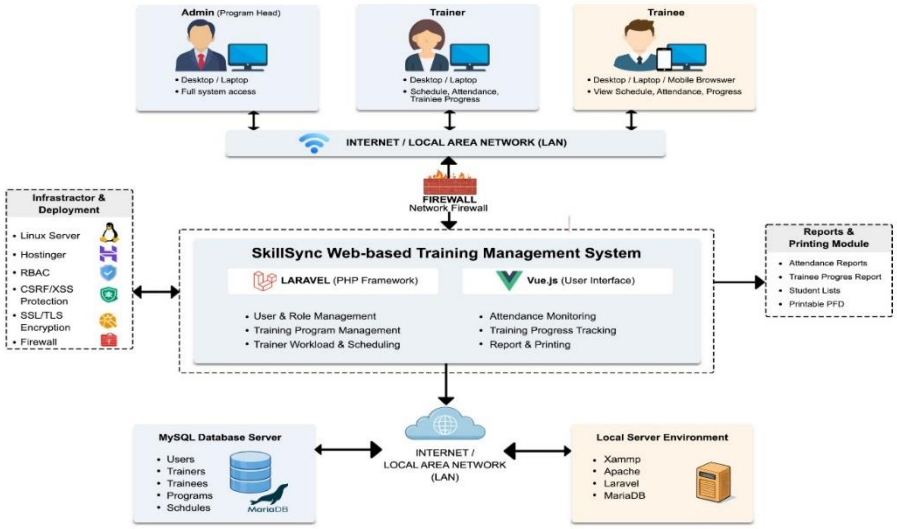

Figure 1

System Architecture of SkillSync

Figure 1 presents the SkillSync system architecture. SkillSync is a web-based application accessed by administrators, trainers, and trainees in desktop and mobile formats via role-based dashboards. Vue.js is a front-end development framework, and Laravel 12 is the development framework for the back-end application. The database used for SkillSync consists of MySQL/MariaDB for the storage of users, training, attendance, and schedule records. SkillSync is hosted on a Hostinger server running on a Linux-based server with PHP 8.2 and other PHP web-based applications running on it.

The SkillSync application is made up of several functional modules allowing users to create and manage their own training program(s), manage the administration of the user role(s) within the training program, including scheduling the sessions, taking attendance, tracking trainee progress against specified objectives, and generating reports and printing. Based on the user role, there will be different dashboard views for the administrator, trainer, and trainee, providing a more organized way to provide access to the training information and system functionality.

In order to maintain the security of your account and the training records associated with your account, SkillSync employs the following security measures: authentication, encrypted password storage, Role-Based Access Control (RBAC), Cross-Site Request Forgery (CSRF) protection, and Cross-Site Scripting (XSS) protection.

RESULTS AND DISCUSSION

This section provides an explanation of how the SkillSync system was evaluated relative to each of the specific objectives in the Statement of the Problem. The system was evaluated by 50 respondents, composed of administrators and trainers as well as trainees of the RMMC School of Technical Vocational Education and Training (STVET). Usability and effectiveness were evaluated using the System Usability Scale (SUS) and descriptive statistical analyses. The findings from both systems will be discussed and compared to existing usability literature.

Finding 1: Effectiveness of the System Based on User Responses

The primary objective of this project was to evaluate the SkillSync system as an effective management tool for training-related information and as a means to facilitate user interactions. The measurement of user responses was completed by administering a five-point Likert scale questionnaire (ten items from the System Usability

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Scale) to all administrators, trainers, and trainees; then calculating mean scores by participant type (administrator, trainer, or trainee) on each item. Before evaluation, unit, integration, and usability testing were all performed on the system to verify that each module functions correctly and integrates into the rest of the system, thus providing accurate information.

Table 4 Average Responses by Respondent Group on a Five-Point Likert Scale

Question	Administrator	Trainers	Trainees
1	4.80	4.80	4.80
2	1.90	1.90	1.80
3	4.70	5.00	4.70
4	1.50	1.20	1.13
5	4.90	4.70	4.40
6	1.60	1.60	1.60
7	4.50	4.40	4.67
8	1.60	1.80	1.90
9	4.70	4.40	4.60
10	1.60	1.70	1.57

The SkillSync application's usability as a training management aid was very positively rated by its users. All of the positive comments received from participants rated the SkillSync application, with average ratings above average. On the other hand, virtually all of the negative comment responses were given an average rating by participants that was lower than the average of the positive ratings given to the SkillSync application by the users who completed the evaluation survey. This indicates that SkillSync provides a significant amount of training management assistance and that it is user-friendly for all user types who will utilize the System within their own respective company.

These findings are well-established usability principles; the type of user that utilizes a system, including those using high amounts of ease of use or clear and concise functionalities, provides a significant amount of satisfaction and successful user performance (Brooke, 2020). Overall, the findings reflect that SkillSync provides a great deal of efficiency and ease of access while performing all tasks related to managing training management activities.

Finding 2: Level of System Usability Based on System Usability Scale Scores

The secondary objective of the study is to evaluate the usability of the system as measured by using the System Usability Scale (SUS). The SUS score is calculated by using the standard scoring system, where you calculate the odd items score separately from the even items score and then combine those together to come up with a usability score that ranges from 0 to 100. Overall mean scores and weighted average scores were calculated in order to assess the overall level of usability and user satisfaction across all respondent groups.

Table 5 Calculated Results of the Odd and Even Numbers

Respondent Group	Odd Score	Even Score
Administrator	16.3	16.8
Trainers	16.6	16.8

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Trainees	18.17	17.0

The result summary of the SUS score of administrators is 82.8, the SUS score of trainers is 83.5, and the SUS score of trainees is 87.9. According to the established SUS interpretation guidelines, these scores fall within the acceptable to excellent range for usability. These results suggest that users rated the system as being easy to learn, efficient to use, and dependable in accomplishing training management activities.

The research study identified that systems which achieve a SUS score greater than 80 are considered by researchers to have an excellent level of usability and an overall positive user satisfaction (Bangor et al., 2008). It is concluded from the above results that SkillSync complies with established usability and provides a positive experience for users across all user types.

Finding 3: Overall User Acceptance of the System

Lastly, to analyze the evaluation data descriptively, we conducted statistical analyses. The SUS score calculation was performed using the standard SUS computation method in order to determine the usability of the software. The results were interpreted to evaluate how well the system met user needs and to identify how effectively the system supports training management tasks.

Table 6 Overall User Acceptance of the System

Respondent Group	**SUS score**	**Interpretation**
Administrator	82.8	Excellent
Trainers	83.5	Excellent
Trainees	87.9	Excellent
Total Weighted Average	86.0	Excellent

As a result, the entire weighted average SUS score was an overall SUS score of 86.0, which is considered to be an acceptable score for user-friendliness of the system according to the SUS score of 86.0. Therefore, this indicates high levels of user satisfaction as well as the overall acceptance of the system by administrators, trainers, and trainees.

(Bangor et al., 2008; Brooke, 2020) found a positive correlation between high levels of usability and adoption of a system; increased performance/efficiency in performing tasks using the system; and overall performance of the organization. Overall, the findings indicate that SkillSync is capable of supporting training management activities and will be implemented in a real-world scenario in the technical vocational sector. The findings further indicate that a web-based training management system, being centralized in nature, could lead to a reduction in work input, increased data integrity, and better communication among stakeholders involved in TVET institutions.

The results of the evaluation indicate that SkillSync is a user-friendly and functional system that will improve the efficiency of training management and enable a digital transformation within the technical vocational education and training area.

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CONCLUSION/INSIGHTS

SkillSync is a web-based training management software developed, designed, and implemented by the School of Technical-Vocational Education and Training (STVET) at Ramon Magsaysay Memorial Colleges (RMMC). Findings demonstrated that SkillSync supports trainer workload, trainee progress, and training program management through the organization and centralization of training information. Results also showed that the system has excellent usability as measured by the System Usability Scale (SUS), meaning those using the system found it easy to learn how to use, efficient to use, and satisfactory to use. Additionally, because users (administrators, trainers, and trainees) rated SkillSync highly, it suggests the system is appropriate for practical use in the training management process. In summary, this study concluded that SkillSync is a practical, user-friendly, and effective solution to enhancing administration/efficiency and performance monitoring while also improving training management in the field of technical-vocational education.

Limitations of the Study

The primary focus of this study was to assess SkillSync's proficiency and efficacy as a tool within the RMMC-STVET context. The evaluation of SkillSync will not involve either large-scale deployments (for example, hundreds of users), long-term scalability testing (for example, years), or advanced cybersecurity assessments (for example, DoD standard). Factors that were beyond the scope of this study include internet connectivity, hardware limitations, and future institutional policy modification.

RECOMMENDATION/IMPLICATIONS

Based on the research findings, it is proposed that the RMMC STVET implement the SkillSync system as a means of more efficiently and centrally managing trainer workload, trainee progress, and training program details. The system’s high usability and favorable user acceptance suggest that this system will allow for more efficient administration and a greater ability to access data, as well as enable more effective monitoring of training activities. Educational institutions with similar types of training management systems may want to consider implementing this system to improve digital recordkeeping and improve the efficiency of their operational processes.

Adding features like automated report generation, mobile web access, immediate data assessment and analysis, and an enhanced security capability will further improve the SkillSync experience for all users while also providing additional functionality. Also, ongoing evaluation of the SkillSync system by developers will allow them to keep up with the changing demands of the training institution, along with receiving input from users. Possible future enhancements include deployment to the cloud, integration with mobile apps, scalability testing for larger institutions, adding additional cybersecurity measures to improve SkillSync's security, and adding advanced analytics to aid educators in implementing the solution within larger institutions.

This research adds to the numerous studies done about digital training management systems and how they help enhance organizational efficiencies within Technical-Vocational Education. Our findings are consistent with past studies in that they confirmed the potential use of User-Centered System Design when it comes to establishing success associated with user acceptance and implementation of new technology. We believe that Usability Tools, including the System Usability Scale, do provide evidence for how effective an educational information system can be through their usability evaluations.

The results suggest that web-based training management systems will help to facilitate digital transformation processes in technical vocational institutions through improved information management, improved decision-making, and improved services.

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