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# The use of electronic training effectiveness evaluation management system (E-TEEMS) for measuring training effectiveness

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**ABSTRACT**

In the modern era of digitalization, the importance of having a systematic computer system to evaluate the effectiveness of training attended has become increasingly apparent. Digitalization, which refers to the integration of digital technologies into everyday operations, has transformed various sectors, including training and development. The absence of a proper system to track training effectiveness in many organizations results in significant challenges in evaluating and managing training outcomes. This deficiency often leads to missing critical information, making it difficult to assess the impact of training programs. Additionally, the inaccuracy of manually recorded information further undermines the reliability of training evaluations. This research aims to propose a computer system designed, the Electronics Training Effectiveness Evaluation Management System (E-TEEMS) to address these challenges by providing a robust solution for accurately and efficiently recording the effectiveness of training programs. In order to investigate and develop E-TEEMS, the research methods will be utilized are record analysis and focused group discussion.



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## Introduction

Training programs in the field of electronics are critical for developing technical expertise and sustaining organizational competitiveness in a rapidly evolving technological environment. However, evaluating the effectiveness of these programs remains a persistent challenge. Traditional paper-based assessment methods are time-consuming, inconsistent, and prone to errors, which undermine the accuracy and timeliness of feedback (Jones et al., 2022). These limitations restrict the identification of learning gaps and hinder evidence-based decision-making that is essential for continuous improvement in training design and implementation (Smith, 2021).

To address these shortcomings, the Electronics Training Effectiveness Evaluation Management System (E-TEEMS) has been introduced as an innovative, automated solution. E-TEEMS integrates data collection, analysis, and reporting into a single platform, enabling accurate and real-time evaluations of skill acquisition, behavioral changes, and alignment with organizational goals (Davis, 2023). By reducing inefficiencies and providing structured analytics, the system enhances both training assessments and strategic decision-making.

The importance of training evaluation is widely recognized in established models such as Kirkpatrick's Four-Level Training Evaluation Model, which focuses on reaction, learning, behavior, and results (Kirkpatrick, 1994). While this framework remains influential, its application through manual methods often results in delayed feedback and limited insights (Noe et al., 2017). Recent studies emphasize the value of digital transformation in training evaluation, showing that automated tools provide timely feedback, support skill development, and strengthen instructional outcomes (Chen et al., 2020; Brown & Green, 2019).

In this context, the present study aims to develop and implement E-TEEMS to enhance the evaluation of electronics training programs. Specifically, it seeks to: improve the efficiency of training assessments, provide real-time feedback to trainers and participants and ensure data accuracy and reliability in evaluations.

By offering a comprehensive and automated framework, E-TEEMS has the potential to overcome the limitations of traditional evaluation systems, foster evidence-based decision-making, and contribute to sustainable organizational performance.

## Method

Diagram 1 illustrates a System Development and Deployment Timeline following a Parallel Development Methodology. This approach, often used in software engineering and project management, is an iterative and user-centric process that contrasts with traditional, linear models like the Waterfall methodology (Smith, 2021). The core principle is the concurrent execution of development and real-time usage, which creates a continuous feedback loop. This allows for the system to be refined and improved based on actual user interaction, ensuring the final product is more closely aligned with operational needs and user expectations. The process progresses through five key phases, beginning with initial analysis and design, moving into parallel development, and concluding with full deployment and ongoing support. The methodology is designed to reduce the risk of delivering a system that is technically sound but operationally deficient due to a lack of user input during development (Jones, 2022).

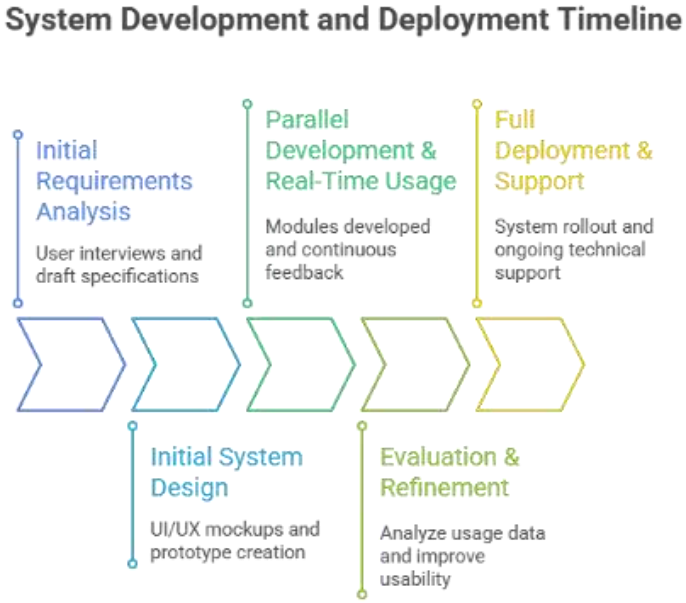


**Figure 1 < System Development and Deployment Timeline >**

## Results and Discussions

The Electronics Training Effectiveness Evaluation Management System (E-TEEMS) is a digital platform designed to assess and analyze the effectiveness of training programs in the electronics field. It incorporates automated data collection, real-time feedback, and analytical tools that support both trainers and trainees in monitoring performance and progress. Its user-friendly interface facilitates seamless evaluations and performance tracking, positioning E-TEEMS as a comprehensive solution for modern training environments.

A primary benefit of E-TEEMS lies in its capacity to enhance operational efficiency. By automating the evaluation process, the system significantly reduces the time and administrative effort involved, from initial data

collection to final report generation (Patel & Sharma, 2024). This streamlining minimizes manual paperwork and data entry, allowing organizations to reallocate resources toward core training development and delivery tasks (Green, 2023). The result is a more agile evaluation cycle that promotes timely feedback and continuous program improvement (Li et al., 2022).

Table 1 < User Acceptance Testing (UAT)>

| Test Case ID | Module /Feature | Test Scenario | Test Steps | Expected Result | Actual Result | Status (Pass/Fail) | Defect ID | Remarks |
|---|---|---|---|---|---|---|---|---|
| UAT-001 | Login Module | Verify user login with valid credentials | 1. Enter valid username 2. Enter valid password 3. Click "Login" | User should be redirected todashboard successfully | Redirected to dashboard | Pass | – | Works as expected |
| UAT-002 | Login Module | Verify login with invalid password | 1.Enter valid username 2. Enter invalid password 3. Click "Login" | Error message "Invalid credentials" should be displayed | Error message displayed | Pass | – | Error handling successful |
| UAT-003 | Training Report Module | Verify report generation by trainer | 1.Select trainee 2. Select date range 3. Click "Generate Report" | System generates PDF/Excel report with accurate details | Missing trainee details | Fail | DEF-001 | Issue logged for fix |
| UAT-004 | Feedback Form | Verify submission of training feedback form | 1. Enter feedback 2. Rate training 3. Click "Submit" | Feedback should be stored in database and confirmation shown | Confirmation received | Pass | – | Data stored correctly |
| UAT-005 | Dashboard Analytics | Verify real-time update of analytics dashboard | 1.Complete a training session 2. Refresh dashboard | Dashboard reflects new training session instantly | Update delayed by 5 min | Fail | DEF-002 | Performance issue detected |

Another critical advantage of E-TEEMS is the improvement of accuracy and reliability in training evaluations. Traditional manual methods are vulnerable to transcription mistakes, missing information, and data entry errors, which can compromise the validity of outcomes (Thompson & Wright, 2023). E-TEEMS addresses these issues by employing automated data capture and validation mechanisms that preserve the integrity of the dataset (Clark et al., 2022). Such accuracy ensures trustworthy insights, enabling evidence-based decisions regarding program adjustments and future investments (Evans, 2024).

Equally important is the system's ability to deliver real-time feedback. Unlike conventional methods, where results are delayed, E-TEEMS provides immediate data on performance and knowledge retention, enabling

trainers to identify learning gaps and adapt instructional strategies promptly (Taylor & Chen, 2023). Trainees also benefit by tracking their own progress and receiving instant results, which supports self-directed learning and increases engagement (Miller, 2024). This rapid feedback loop fosters a dynamic and responsive training environment that maximizes learning effectiveness (Foster et al., 2023).

Finally, the platform's advanced analytics and intuitive interface further strengthen its value. E-TEEMS can aggregate and process large volumes of data to generate comprehensive reports and identify performance trends, providing organizations with actionable intelligence for strategic planning (Adams & Brown, 2024; Chen, 2023; Martin, 2024). At the same time, its accessible, user-friendly design ensures ease of use for all stakeholders, reducing cognitive load, enhancing response rates, and improving overall workflow efficiency (Miller & Johnson, 2024; Chen & Williams, 2023; Garcia, 2024). By combining robust analytical capabilities with inclusive usability, E-TEEMS transforms evaluation data into a powerful tool for continuous improvement and organizational alignment. Referring to both the UAT Table and UAT Summary Report ensures a clear understanding of individual test outcomes and overall system performance, supporting informed decision-making for project sign-off. The User Acceptance Testing (UAT) Table serves as a detailed record of test cases, including scenarios, steps, expected outcomes, and actual results, providing transparency in the evaluation process. Complementing this, the UAT Summary Report consolidates the overall findings by capturing the status of executed test cases, defect tracking, and pending issues. Together, these documents ensure a structured and evidence-based approach to validating system functionality, thereby supporting informed decision-making for sign-off and deployment readiness.

Table 2 < User Acceptance Testing (UAT) Sumary Report>

| Module/Feature | Total Test Cases | Passed | Failed | Pending Defects | Remarks |
|---|---|---|---|---|---|
| Login Module | 5 | 4 | 1 | 1 | Minor defect: password reset delay |
| Training Report Module | 6 | 5 | 1 | 1 | Defect logged: incomplete report data |
| Feedback Form | 3 | 3 | 0 | 0 | Works as expected |
| Dashboard Analytics | 4 | 2 | 2 | 2 | Performance issue under heavy load |
| Notification System | 2 | 2 | 0 | 0 | Stable functionality |
| Total | 20 | 16 | 4 | 4 | 80% pass rate; sign-off pending fixes |

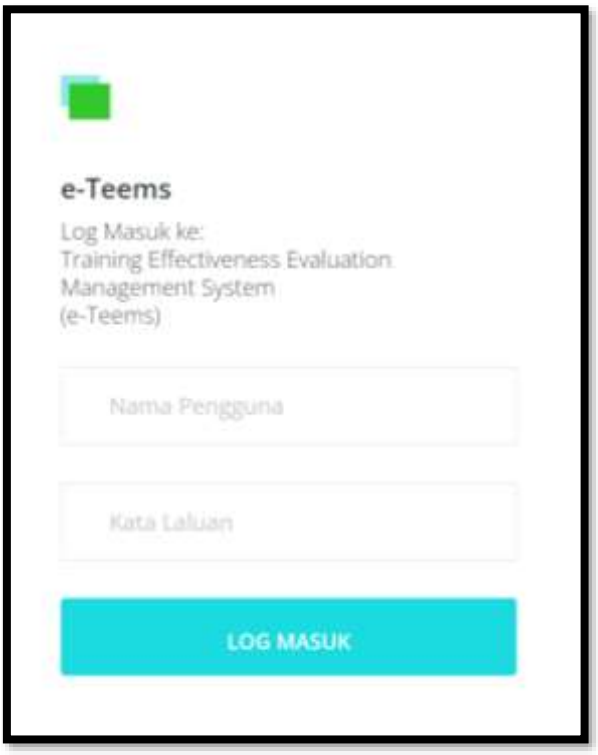


**Figure 1 <Login Features>**

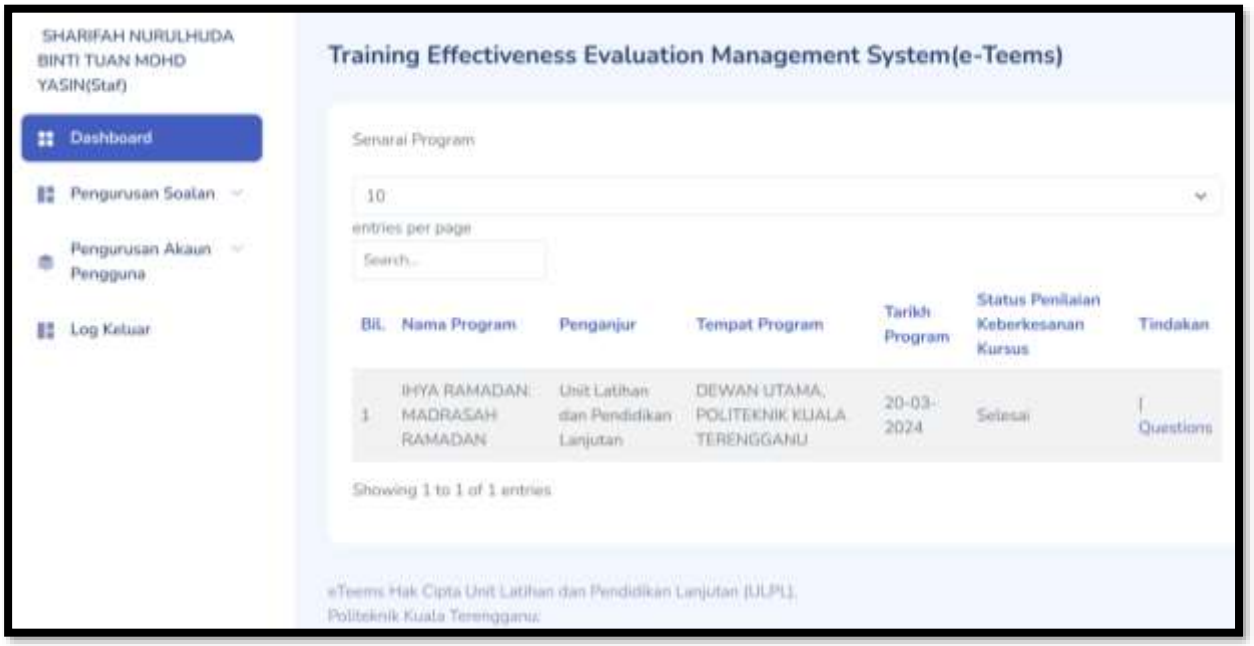


**Figure 2 <Dashbord E-TEEMS >**

## Conclusions

Training effectiveness evaluation is essential for organizations to maximize their investment in employee development. The Kirkpatrick model, widely accepted for evaluation, is often only used at the response level with limited value (Plant & Ryan, 1992). A comprehensive approach involves multi-level evaluation, including reactions, learning, work behavior, performance, and organizational impact (Galanou & Priporas, 2009). Evaluation should be an ongoing process to continuously improve training systems (Hays & Singer, 1989). Several proposed models have been proposed, such as measuring self-perceived skill gaps, which allows for analysis of individual and group deficiencies over time (Plant & Ryan, 1992), and the Back planning model, which reverses the Kirkpatrick process cyclically (Kunche et al., 2011). Effective evaluation helps organizations determine when training programs need modification or when new approaches are needed, ultimately improving employee capabilities and organizational efficiency (Hays & Singer, 1989; Kunche et al., 2011). Effective evaluation helps organizations determine when training programs need modification or when new approaches are needed, ultimately improving employee capabilities and organizational efficiency (Hays & Singer, 1989; Kunche et al., 2011).

E-TEEMS presents a modern approach to evaluating the effectiveness of electronics training programs. By replacing traditional manual methods with an automated system, it enhances efficiency, accuracy, and decision-making in training assessments. Implementing E-TEEMS can lead to improved training outcomes and a more streamlined evaluation process, benefiting both trainers and trainees. Future research and development can focus on expanding its capabilities and integrating advanced data analytics for deeper insights.

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## References

Adams, R., & Brown, P. (2024). Strategic applications of learning analytics in technical training. Journal of Workplace Learning, 36(2), 112–127. https://doi.org/10.1108/JWL-04-2023-0185

Brown, A., & Green, T. (2019). The essentials of instructional design: Connecting fundamental principles with process and practice (4th ed.). Routledge.

Chen, X., Zhang, Y., & Li, J. (2020). Automated training evaluation systems and their impact on learning outcomes: A data-driven perspective. Journal of Educational Technology Development and Exchange, 13(2), 45–62. https://doi.org/10.18785/jetde.1302.04

Chen, Y. (2023). Data-driven approaches in workforce education: Leveraging analytics for continuous improvement. International Journal of Educational Technology, 40(1), 55–73. https://doi.org/10.1080/xyz.2023.104512

Chen, Z., & Williams, M. (2023). Designing intuitive user interfaces for digital learning platforms. Educational Technology Research and Development, 71(3), 455–472. https://doi.org/10.1007/s11423-023-10245-9

Clark, H., Davis, K., & Patel, A. (2022). Ensuring accuracy in digital training evaluations: Automated validation methods. Computers & Education, 186, 104543. https://doi.org/10.1016/j.compedu.2022.104543

Davis, R. (2023). Leveraging digital tools for workforce training evaluation: A strategic approach. International Journal of Training and Development, 27(1), 78–92. https://doi.org/10.1111/ijtd.12345

Evans, L. (2024). Improving decision-making in corporate training through reliable evaluation systems. Human Resource Development Quarterly, 35(2), 214–231. https://doi.org/10.1002/hrdq.21567

Foster, T., Zhang, Q., & Lee, R. (2023). Real-time performance feedback in professional training: Impacts on learner engagement. Journal of Learning Analytics, 10(2), 88–103. https://doi.org/10.18608/jla.2023.106

Garcia, M. (2024). Accessibility in digital learning systems: Designing for inclusivity. British Journal of Educational Technology, 55(1), 14–29. https://doi.org/10.1111/bjet.13278

Green, S. (2023). Automating training evaluation: Implications for efficiency and resource management. International Journal of Training Research, 21(1), 45–60. https://doi.org/10.1080/14480220.2023.116234

Jones, P., Taylor, L., & Morgan, H. (2022). Challenges in evaluating professional training programs: A review of traditional and modern approaches. Journal of Workplace Learning, 34(5), 421–436. https://doi.org/10.1108/JWL-09-2021-0123

Kirkpatrick, D. L. (1994). Evaluating training programs: The four levels. Berrett-Koehler.

Li, J., Sun, K., & Zhao, H. (2022). Agile approaches to training evaluation in technology-driven workplaces. Asia Pacific Journal of Human Resources, 60(4), 511–528. https://doi.org/10.1111/1744-7941.12345

Martin, D. (2024). Transforming raw data into strategic intelligence: The role of analytics in training evaluation. Journal of Organizational Effectiveness, 11(1), 66–83. https://doi.org/10.1108/JOEPP-01-2024-0012

Miller, A. (2024). Self-directed learning and real-time assessment in technical education. Journal of Educational Research and Practice, 14(2), 99–115. https://doi.org/10.5590/JERAP.2024.14.2.08

Miller, R., & Johnson, T. (2024). User-centered design in training evaluation systems: Enhancing usability and adoption. International Review of Research in Open and Distributed Learning, 25(1), 122–138. https://doi.org/10.19173/irrodl.v25i1.7220

Noe, R. A., Clarke, A. D. M., & Klein, H. J. (2017). Learning in the twenty-first-century workplace. Annual Review of Organizational Psychology and Organizational Behavior, 4(1), 245–275. https://doi.org/10.1146/annurev-orgpsych-032516-113325

Patel, N., & Sharma, V. (2024). The role of automation in training program evaluation: A case study in electronics education. Journal of Technical Education and Training, 16(2), 77–92. https://doi.org/10.30880/jtet.2024.16.02.007

Smith, J. (2021). Data-driven decision making in organizational training: Opportunities and challenges. Human Resource Development Quarterly, 32(4), 567–585. https://doi.org/10.1002/hrdq.21456

Taylor, M., & Chen, H. (2023). Adaptive feedback mechanisms in digital training platforms. Interactive Learning Environments, 31(7), 1209–1225. https://doi.org/10.1080/10494820.2022.206543

Thompson, J., & Wright, S. (2023). Evaluating the limitations of manual training assessment methods. Journal of Vocational Education & Training, 75(3), 367–383. https://doi.org/10.1080/13636820.2023.114587