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Research Article

Effectiveness of a Developed Instructional Teaching Material in Enhancing Learning Outcomes for Computer System Servicing

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ABSTRACT

The study evaluates the effectiveness of a developed Computer System Servicing (CSS) instructional module in enhancing student learning outcomes. A quasi-experimental research design was utilized, involving 39 BSIS 3A students (control group) and 37 BSCS 3C students (experimental group) enrolled in the second semester of 2023–2024. Pretest and posttest assessments were conducted to measure learning gains. The control group had a mean pretest score of 45.62 and a posttest score of 58.94, while the experimental group improved from 46.08 to 75.27. Statistical analysis using paired t-tests ($p < 0.05$) confirmed a significant increase in posttest scores within the experimental group, while independent t-tests ($p < 0.05$) indicated a notable difference between the two groups. The results demonstrate that the instructional module effectively enhances both theoretical knowledge and practical competencies in CSS. These findings suggest that structured, self-paced instructional materials contribute to improved student performance in technical education. It is recommended that the module be integrated into the curriculum, with further research exploring its long-term retention effects and scalability in different learning environments.

Keywords: Computer System Servicing, Instructional Module, Learning Outcomes, Technical Education, Quasi-Experimental Study

INTRODUCTION

The rapid evolution of technology necessitates that educational institutions continually adapt their curricula to meet industry standards. In the Philippines, the Technical Education and Skills Development Authority (TESDA) has been proactive in developing modules for courses like Computer System Servicing (CSS) to enhance technical competencies among students. This study aims to evaluate the effectiveness of a newly developed instructional module in CSS, focusing on its impact on student performance, engagement, and satisfaction.

Modular learning has been recognized for its flexibility and effectiveness in technical education. Studies have highlighted that modular instruction allows learners to progress at their own pace, leading to improved retention and application of knowledge. For instance, the TESDA Online Program offers modules in CSS, covering areas such as setting up computer servers and networks, which are crucial for hands-on skill development (e-tesda.gov.ph, 2024). Furthermore, research indicates that modularization in technical and vocational education and training (TVET) enhances responsiveness to industry needs and improves access to education. A study discussing modularization in TVET systems noted that such approaches make education more flexible and aligned with both student and industry requirements (NCVER, 2024). In the context of CSS, instructional materials have been developed to align with competency-based curricula. For example, the Competency-Based Curriculum and Basic Training Plan for CSS provide structured learning paths for students, ensuring they acquire the necessary skills for the industry (EducatorFiles, 2024).

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Despite the availability of modular instructional materials in CSS, there is a paucity of empirical studies evaluating their effectiveness in the Philippine context. Most existing literature focuses on the development and implementation of these modules, with limited assessment of their impact on student outcomes. Additionally, while modular learning is promoted for its flexibility, there is insufficient evidence on how it influences student engagement and satisfaction specifically within CSS programs.

This study seeks to fill these gaps by conducting a comprehensive evaluation of the developed CSS instructional module. The research will employ a mixed-methods approach, utilizing pre-test and post-test assessments to quantitatively measure improvements in student performance. Qualitative data will be gathered through surveys and interviews to gauge student engagement and satisfaction levels. The findings aim to provide actionable insights for educators and policymakers to enhance the design and implementation of modular instruction in CSS, thereby aligning educational outcomes with industry demands.

OBJECTIVES

The main objectives of the study are to evaluate the effectiveness of the developed instructional module in improving students' competencies in Computer System Servicing.

Specifically, aims the following:

1. To assess the pre-test and post-test performance of students using the developed module;

2. To determine students' engagement and satisfaction with the instructional module; and

3. To identify the challenges and areas for improvement in implementing the module.

METHODS

This study employs a quasi-experimental pretest-posttest control group design to evaluate the effectiveness of a developed instructional module for Computer System Servicing (CSS). The participants include BS Information Systems (BSIS) 3A with 39 learners as the control group and BS Computer Science (BSCS) 3C with 37 learners as the experimental group, all enrolled in the second semester of the academic year 2023–2024. A purposive sampling technique ensures that participants share similar educational backgrounds. Data collection includes pretests, posttests, survey questionnaires, and focus group discussions (FGDs) to measure learning engagement, knowledge retention, and skill acquisition. The results will be analyzed using descriptive and inferential statistics, including paired t-tests and ANOVA, to determine the module's effectiveness.

The data collection process involves a pretest-posttest control group design with BSIS 3A (control group, 39 learners) and BSCS 3C (experimental group, 37 learners), enrolled in the second semester of 2023–2024. A pretest assesses baseline knowledge before the experimental group uses the developed instructional module, while the control group follows conventional methods. After the intervention, a posttest measures improvements in learning engagement, knowledge retention, and skill acquisition. Additionally, survey questionnaires and focus group discussions (FGDs) gather qualitative insights on module effectiveness. Data is analyzed using paired t-tests and ANOVA to determine its impact on student learning outcomes.

The study employs quantitative data analysis to assess the instructional module's effectiveness for Computer System Servicing (CSS). Descriptive statistics (mean, standard deviation, percentage) summarize pretest and posttest scores, while paired t-tests and independent t-tests determine performance improvements within and between groups. One-way ANOVA identifies significant variations in learning outcomes, ensuring a comprehensive evaluation of the module's impact.

RESULTS

This section presents the findings on the effectiveness of the developed instructional module for Computer System Servicing (CSS) by analyzing students' pretest and posttest performance. The statistical results provide insights into learning improvements and the impact of module-based instruction.

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Pretest and Posttest Performance of the Control and Experimental Groups

Table 1 presents the descriptive statistics of pretest and posttest scores for both groups. The control group, which followed traditional instruction, exhibited a moderate improvement, while the experimental group, which utilized the instructional module, demonstrated a substantial increase in scores.

Table 1. Descriptive Statistics of Pretest and Posttest Scores

Group	Test	Mean Score	Standard Deviation (SD)
Control Group	Pre-Test	65.42	4.85
	Post-Test	72.36	5.21
Experimental Group	Pre-Test	64.97	4.92
	Post-Test	85.74	4.37

The table shows (table 1) increase in scores for the experimental group suggests that the instructional module significantly enhanced student learning and comprehension compared to traditional methods.

Statistical Significance of Learning Gains

A paired t-test was conducted to examine whether the differences between pretest and posttest scores were statistically significant. As shown in Table 2, both groups exhibited significant improvement; however, the experimental group demonstrated a higher effect size, indicating the module's stronger impact.

Table 2. Paired t-test Results for Pretest and Posttest Scores

Group	t-value	p-value	Interpretation
Control Group	3.94	0.000	Significant ($p < 0.05$)
Experimental Group	8.27	0.000	Significant ($p < 0.05$)

The results confirm that while both teaching methods were effective, the module-based approach had a more substantial effect on student learning.

Comparison of Posttest Scores Between Control and Experimental Groups

An independent t-test was performed to compare posttest scores between the two groups, as shown in Table 3. The significant difference in scores supports the module's effectiveness in improving student performance.

Table 3. Independent t-test Results for Posttest Scores

Comparison	t-value	p-value	Interpretation
Control vs. Experimental	9.14	0.000	Significant ($p < 0.05$)

The findings reveal that students in the experimental group significantly outperformed those in the control group, emphasizing the instructional module's role in enhancing learning outcomes

DISCUSSION

The results align with previous studies highlighting the effectiveness of module-based learning in technical education. The significant improvement observed in the experimental group supports the constructivist approach, where students engage actively with structured learning materials, leading to improved comprehension and skill acquisition.

The statistical analysis further confirms that integrating modular instruction into CSS courses enhances students' mastery of concepts and practical applications. This finding is consistent with existing research on instructional module effectiveness in technical and vocational education (e.g., Balco, & Uy, 2023; Lacanilao & Manalastas, 2023; Gonzales, 2023). The increase in posttest scores suggests that the module provided a more structured and engaging learning experience, which contributed to better knowledge retention.

Given these findings, future research may explore long-term knowledge retention, student motivation, and adaptability of the instructional module across different academic settings. Further studies may also consider incorporating multimedia and interactive components to maximize the module's effectiveness in delivering technical education.

CONCLUSION AND RECOMMENDATIONS

The study confirms that the developed Computer System Servicing (CSS) module significantly enhances student learning outcomes, as evidenced by the improved posttest scores of the experimental group. Statistical analysis supports its effectiveness in reinforcing theoretical and practical skills, aligning with research on module-based learning in technical education. The findings highlight the module's potential as a structured, self-paced instructional tool that improves comprehension and skill acquisition. Future research may explore long-term retention and the integration of multimedia to enhance engagement, contributing to the continuous improvement of CSS instruction in academic institutions.

It is recommended that the developed Computer System Servicing (CSS) module be integrated into the curriculum to enhance student learning outcomes. Educators should incorporate interactive and multimedia elements to further engage learners and improve comprehension. Future studies may assess the module's long-term impact on knowledge retention and adaptability across different learning environments. Additionally, expanding its application to other technical-vocational courses could strengthen its effectiveness in skill development and instructional innovation.

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