Enhancing Student Knowledge through a Customized Academic Software Guide: A Study in the Department of Family Welfare Education

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Abstract. Effective use of academic software is crucial for enhancing research quality, especially in multidisciplinary programs such as the Department of Family Welfare Education, which covers nutrition, culinary arts, fashion, and beauty. However, a survey showed that 68% of students lacked confidence in using SPSS, Mendeley, and Zotero due to limited training and guidance. This study developed and evaluated an academic software guide to strengthen students' research skills. Using a Research and Development (R&D) design with 60 stratified-sampled students, the intervention included modular tutorials and hands-on exercises. The pretest–posttest results showed a significant improvement, with scores rising from 56.2 to 84.7 (a 50.7% increase; $p < 0.001$). Moreover, 91.6% of participants reported better scientific writing skills. The findings indicate that the developed guide effectively enhances students' proficiency and should be integrated into institutional policy to improve digital literacy and research productivity in higher education.

Keywords: academic software, research competence, undergraduate students, instructional guide, digital literacy

1 Introduction

In digital era, technological proficiency has become a crucial element in supporting students' academic competencies, particularly in the preparation of scientific papers [1]. The use of academic software such as Mendeley, Zotero, and SPSS is now considered fundamental in the research process—whether for managing references, analyzing data, or composing reports in a systematic and scientifically appropriate manner[2] . However, in practice, many students still lack the necessary skills to operate such software effectively. Limited training, lack of access to technical assistance, and the absence of structured guidance are the main barriers to optimal utilization of academic software among students.

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This issue is also prevalent in the Department of Family Welfare Education, which encompasses multidisciplinary study programs such as nutrition, culinary arts, fashion, and beauty. Students in these programs are expected to produce academic papers in accordance with scholarly standards, yet often face challenges in mastering the tools required for this process. A preliminary survey revealed that approximately 68% of students reported low confidence in using software like SPSS, Mendeley, and Zotero. This is not due to a lack of motivation, but rather because they have never received systematic training or an accessible, needs-based guide. Such a lack of digital literacy has the potential to compromise research quality and hinder the achievement of graduate learning outcomes, particularly in the domains of critical thinking and academic writing.

Digital literacy is one of the core competencies in 21st-century higher education. According to UNESCO 2020, digital literacy encompasses not only technical skills but also critical understanding, ethical use of digital information, and the ability to solve problems using technology[3]. In higher education settings, students are expected to be active users of technology not just passive consumers who can apply digital tools to support their academic goals[4]. Therefore, educational institutions need to provide appropriate learning resources, including contextually relevant and accessible academic software guides.

One effective approach to addressing this issue is the development of customized academic software guides tailored to the characteristics and needs of students in non-technical programs. These guides can be designed in the form of modular tutorials and practice-based exercises, enabling students to learn independently and incrementally[5]. According to the theory of scaffolded instruction, students grasp material more effectively when supported with gradual assistance that is withdrawn as their understanding improves[6]. In this way, the guide serves not only as a technical aid but also as a tool to enhance academic capacity and independent learning.

Within the framework of the *Merdeka Belajar – Kampus Merdeka* (MBKM) policy, students are encouraged to develop their competencies independently, including in preparing their final projects and academic publications[7]. Practical support in the form of guidebooks is therefore essential to help students write academic papers that meet scholarly and ethical standards[8]. Moreover, proficiency in using academic software contributes to the improvement of both individual student research productivity and the overall research output of the institution.

Based on this background, the present study aims to develop and evaluate a tailored academic software guide specifically designed for students in the Department of Family Welfare Education. The primary objective of the guide is to enhance students' knowledge and understanding in using academic software such as SPSS, Mendeley, and Zotero for scientific writing. It is expected that this guide will improve the efficiency and quality of student research, while also contributing to the reinforcement of digital literacy in higher education environments.

2 Method

This study employs a Research and Development (R&D) approach aimed at developing and evaluating a tailored academic software guide to enhance students' research competencies. This approach was chosen as it allows the researcher to produce an educational product in the form of a practical modular guide, based on the real needs of students across multiple programs in the Department of Family Welfare Education, which includes Nutrition, Culinary Arts, Fashion, and Beauty programs.

The research was conducted in several main stages, which reflect the R&D model: user needs identification, guide design, content validation, limited trials, revisions, and limited implementation[9]. Needs identification was carried out through an initial survey among students to assess the barriers and the level of proficiency in using academic software such as SPSS, Mendeley, and Zotero. The survey results were used as a basis for developing the guide content that is contextually relevant to the multidisciplinary nature of the department.

Sampling was carried out using stratified sampling, a tiered sampling technique that considers the heterogeneity of the population based on study programs. The population for this study consisted of all active students in the four programs within the department, who were currently enrolled in or had previously taken research methodology or final project courses. From this population, a proportional sample from each strata (program) was determined, resulting in a total of 60 respondents. This technique was chosen to ensure fair representation and allow for the generalization of the results to the entire department.

The primary instrument in this study was a knowledge test in the form of a pretest and posttest to measure students' improvement in understanding the use of academic software. The test was developed based on competency indicators aligned with the learning objectives related to the use of academic software for academic writing. The test content covered five main themes, as detailed in the following table 1.

Table 1. Themes and Number of Questions in the Knowledge Test

No.	Theme of the Questions	Number of Questions	Brief Description
1	Basic Understanding of Academic Software	5	Assessing familiarity with the general functions of SPSS, Mendeley, and Zotero
2	Steps for Using SPSS	5	Testing understanding of data input flow, descriptive analysis, and basic statistics
3	References and Citations with Mendeley	5	Assessing the ability to insert, manage, and automatically cite references
4	Reference Management with Zotero	5	Assessing understanding of Zotero's basic features and browser integration
5	Software Application in Academic Writing	5	Measuring the integrative ability to apply software in the writing process

The developed product is a modular academic guide that includes practical instructions on the use of three major software tools: SPSS for statistical analysis, Mendeley for reference management, and Zotero as an additional alternative. Each module consists of a brief theoretical section, step-by-step usage instructions, and case-based self-study exercises. Implementation was carried out through training sessions that were divided into small groups. Participants received material and hands-on practice using the guide through tutorial and demonstration-based approaches.

The pretest and posttest data were analyzed using parametric statistical tests, specifically the paired sample t-test, to determine whether there was a significant difference between the scores before and after the training. The analysis was conducted using the latest version of SPSS software, and the results served as the basis for evaluating the effectiveness of the guide. Meanwhile, qualitative data from the perception questionnaire were analyzed descriptively to examine the trends in user responses to the developed guide.

3 Results and Discussion

The improvement in students' understanding of academic research skills was significantly noticeable after the implementation of the specially developed guidebook tailored for the needs of students across different programs in the Department of Family Welfare Education. This guidebook was designed based on the real needs of students in preparing scientific papers, focusing on aspects such as automated citation and data analysis. It is presented in the form of a systematic and easy-to-understand practical guidebook.

Based on the results of the pretest and posttest, the average score of students before the intervention was 56.2, and it increased to 84.7 after using the guide, showing an improvement of 50.7%. Statistical analysis with the paired t-test revealed that this improvement was statistically significant with a p-value of < 0.001. This indicates that the use of the guidebook has a positive impact on students' understanding of academic activities, especially in writing scientific articles.

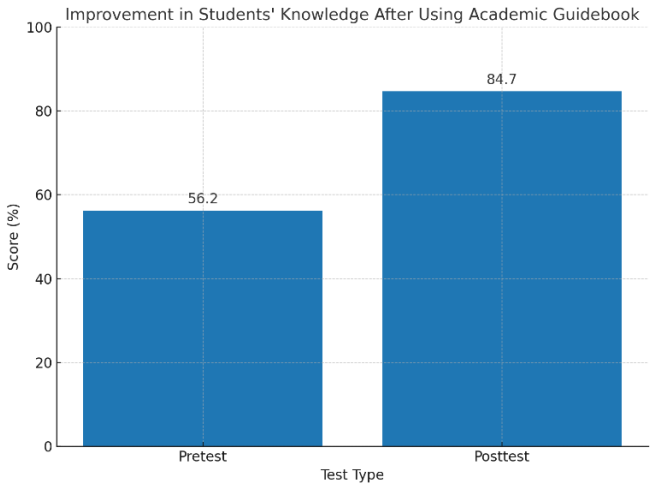

Figure 1. Average Pretest and Posttest Scores of Students

Meanwhile, the detailed results of the quantitative testing are shown in the table below:

Table 2. Summary of Pretest and Posttest Results

Parameter	Pretest	Postest	Increase (%)	p-value
Average Score	56.2	84.7	50.7	< 0.001

These results support the hypothesis that the intervention in the form of a contextually developed academic guidebook successfully addresses gaps in research literacy and mastery of scientific procedures among students. The modular approach structured in the guidebook enables students to learn the stages of using academic support tools gradually and independently. This study is in line with the findings which emphasize the effectiveness of textbook-based learning media in improving students' academic literacy[10]. The guidebook facilitates the understanding of a structured scientific thought process, starting from collecting references, citation writing techniques, to the interpretation of data analysis results. This is especially important for students from non-methodological programs such as culinary arts, fashion, and beauty, who are generally unfamiliar with the practices of quantitative research or the technicalities of academic writing.

A post-intervention satisfaction survey also indicated that 91.6% of students reported that the guidebook helped them write scientific articles in a more systematic and organized manner. This shows that the benefits of the guidebook extend beyond cognitive aspects (knowledge) and also affective aspects (confidence and motivation). The increase in students' confidence in using academic strategies is an important aspect in building a strong research culture in higher education environments[11].

In the context of higher education, improving students' competence in preparing scientific papers is key to producing graduates who are not only practically competent but also capable of producing research-based innovations[12]. The availability of contextual and applicable teaching materials is one of the key factors for the successful implementation of research-based learning in higher education[13]. The guidebook developed in this study not only serves as a learning aid but also as a medium for students to reflect on their scientific thinking processes.

Institutionally, the results of this study can serve as a basis for developing academic policies, particularly in strengthening student research activities through the integration of academic guides into curricula or routine training. Print-based media training in improving research capacity for vocational students is very important to carry out[14]**.** Thus, the data and discussion above show that the use of the academic guidebook, designed based on students' real needs, has had a significant impact on improving research knowledge and skills. This guidebook is recommended for integration into formal learning systems as part of a strategy to enhance academic literacy and student research productivity.

The guidebook's success highlights the importance of creating contextually relevant learning resources that address specific gaps in students' research literacy. By incorporating modular tutorials and practical exercises, the guidebook allows students from diverse programs, including those in culinary arts, fashion, and beauty, to gradually learn and master the essential academic tools. This approach fosters independent learning, enabling students to develop crucial research skills at their own pace. The focus on quantitative research methods, data analysis, and academic writing techniques helps bridge the gap for students who may be unfamiliar with the

technicalities of scientific writing, thus contributing to the development of a well-rounded research culture within the department.

Furthermore, the study's findings suggest that providing accessible, structured materials for research training can have long-lasting benefits for students. Beyond improving academic knowledge, the guidebook also plays a crucial role in fostering a mindset that values systematic thinking and evidence-based practices. In the context of vocational programs, where practical skills often take precedence, this guidebook helps balance the need for hands-on experience with the essential theoretical foundation necessary for producing research-driven innovations. As a result, this intervention can not only enhance students' academic performance but also prepare them to contribute to knowledge creation in their respective fields.

4 Conclusion

This study demonstrates that the development of a contextually tailored academic guidebook, designed to meet the needs of students in the Department of Family Welfare Education, has had a significant impact on improving knowledge in the use of research support software. Through the Research and Development (R&D) approach, implemented in the form of learning modules and practical exercises, the average knowledge scores of students increased from 56.2 on the pretest to 84.7 on the posttest, reflecting a 50.7% statistically significant improvement ($p < 0.001$). This proves that the guidebook has made a tangible contribution to strengthening students' digital literacy and technical abilities in systematically composing scientific papers.

Furthermore, the evaluation results indicate that the majority of respondents (91.6%) reported direct benefits from the guide, particularly in helping them write more structured scientific articles. Considering that students come from various multidisciplinary programs, such as nutrition, culinary arts, fashion, and beauty, this guide also successfully bridges the competency gap in utilizing academic software relevant to cross-disciplinary needs.

Based on these findings, it is recommended that this guidebook be adopted as part of the institution's academic policy and integrated into courses that support research skills. Additionally, the development of further guides covering other software tools, face-to-face training, and digital mentoring can serve as a strategic step to expand the positive impact on supporting students' research productivity and improving the quality of academic publications in higher education environments.

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