Implementation of Academic Management Information System Based on Website as an Effort to Improve Academic Management Effectiveness at SMA Negeri 9 Banda Aceh

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Abstract. The success of an educational organization depends on access to relevant and up-to-date information. The administration management of an institution will determine the quality of education, where the available information is obtained from good academic activities. This research aims to improve the effectiveness of academic management by implementing a web-based academic management information system, providing optimal services in planning, implementation, and efficient evaluation at SMA Negeri 9 Banda Aceh. This research employs a quantitative method using a one-group pretest-posttest design. Data were collected through interviews, observations, and surveys. The research was conducted at SMA Negeri 9 Banda Aceh, with a sample size of 54 teachers and 258 students. The results of the research show that the planning, implementation, and evaluation of the web-based academic management system are functioning well and can improve academic management effectiveness, with an N-Gain Score value of 65,68%, categorized as effective.

Keywords: Information System, Effectiveness, Academic Management.

1 Introduction

Management is a crucial concept involved in nearly every aspect of human activity, ultimately affecting daily routines. According to Syafaruddin (2015) [1], management is the act of managing and utilizing the resources of an organization effectively and efficiently to achieve organizational goals through the cooperation of its members. Schools or educational institutions cannot be separated from management. Schools have principals, teachers, and educational personnel, as well as students as the main focus of education. Undoubtedly, all of that requires effective, directed, and well-planned management since educational institutions will always strive to improve the efficiency and effectiveness of their management to maintain their existence and relevance.

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Management and administration are two interrelated aspects, where the utilization of information technology can enhance the effectiveness and efficiency of administration. In an institution or organization, information systems are used as tools to solve problems and facilitate accurate decision-making. Once implemented, these systems can provide better services. The availability of information can also help reduce risks by reducing uncertainties [2]. The success of an educational institution is heavily reliant on access to relevant and up-to-date information. The quality of education is determined by the management of administrative affairs, where the availability of pertinent information is acquired through efficient management practices. With the rapid advancements in technology, both public and private educational institutions face significant challenges. It is expected that all sectors of education will leverage information technology to support operational activities and produce essential information.

In the current era, companies, institutions, and other organizations increasingly rely on information systems to carry out their operations. This involves data acquisition, receiving instructions, and processing data in accordance with commands to produce desired outputs [3] or high-quality information [4]. Currently, educational institutions in Indonesia are improving their data management and services. One of the crucial components that require attention in their operational activities is the academic sector. According to Mehrolia et al (2021) [5], academic activities involve engaging students in educational pursuits, fostering positive participation, and yielding desired outcomes such as student satisfaction, high grades, and other associated activities.

In the end, the implementation of an information system will result in the utilization of a website or online platform that can be accessed and navigated through a computer connected to the internet. According to data collected by BPS as part of the 2020 Susenas Survey, 53.73% of the Indonesian population accessed the internet in 2020. This increase in internet usage reflects a society that is open to information and accepting of technological innovations as we transition towards an information-based society. Furthermore, digital service data from Kemendikbudristek indicates that the implementation of technology in education has been operationalized in various categories such as students, schools, teachers, culture and language, parents, local government, society, and partners. These digital services can take the form of applications such as DAPODIK, e-Raport, NUPTK, BOS, SIM-PKB, school/madrasah accreditation, and more.

The issue at hand concerns the effectiveness of utilizing academic management information systems. Managing a school's academic affairs involves several personnel, expanding the scope of control and involving multiple external parties. Hence, academic management necessitates a reliable, accurate, relevant, transparent, measurable, and consistent information system. According to Alfaini (2021) [6], academic management information systems are crucial in enhancing the efficiency of educational administration.

Based on the preliminary survey results at the research site, SMA Negeri 9 Banda Aceh, which involved interviewing the curriculum vice-principal and school principal, it was observed that academic activities are progressing, albeit with less than optimal effectiveness and efficiency. The suboptimal performance is evident in the manual processes utilized for creating class schedules, data backups, data reporting, teacher journaling, student attendance tracking, counseling consultations, teacher and student information management, and other

operational activities. The utilization of information technology has yet to reach its maximum potential, resulting in repeated, inaccurate, and unrecorded data, as well as faulty evaluation, extended search times, and inconsistent data due to a lack of centralized storage. Additionally, academic data archiving still relies on printed materials, increasing the risk of loss or damage, and hampering system performance in providing information. Moreover, the presentation of information is still limited to typing, with all data produced processed manually via Microsoft Office and Excel applications and saved to a computer.

According to a study conducted by Purwanto (2017) [7], the implementation of academic information systems at SMP Negeri 2 Paguyangan can aid and enhance the effectiveness and efficiency of academic management. According to Hidayah's research (2019) [8], menjelaskan sistem Informasi Akademik (SIA) digunakan relatif baik dalam proses the Academic Information System (SIA) has been utilized effectively in improving academic services. On the other hand, Masturoh et al (2019) [9], found that web-based academic information system software serves as a means of communication between students, faculty, and institutions, facilitating access to student-related data and academic activities. Anam & Muharram (2018) [10] explain that academic information systems accelerate the process of recording teacher and student data, class schedules, and assessments.

From the study results that have been conducted, it was found that educational institutions require data and information that can be used to optimize educational activities. Therefore, the implementation of an information system becomes very important in the management of academic administration in educational institutions. An academic management information system can also assist educational institutions in managing students' academic matters by providing effective, efficient, and accountable services, as well as generating accurate, and relevant reports [6],[9].

2 Method

The research method employed in this study is quantitative, utilizing the one group pretest-posttest experimental design. This design is not intended to compare the control group with the experimental group, but rather to compare pretest scores with posttest scores. The following is an overview of the design framework:

$$O_1 – X – O_2$$

Explanation:

O_1 = Pretest Score (Before the intervention)

X = Intervention in the form of utilizing academic management information system based on website

O_2 = Posttest Score (After the intervention)

The sampling technique employed in this study is the proportionate stratified random sampling, which is a probability sampling technique. The population size comprises of 800 students and 54 teachers from SMA Negeri 9 Banda Aceh. The sample size is determined using the Nomogram Harry King method with a 5% margin of error, 95% confidence level,

and a multiplier factor of 1,195. Accordingly, a sample size of 27% of the total population, i.e., 258 students, and a complete enumeration of 54 teachers was obtained. The data analysis technique involves conducting the N-Gain score analysis test with the assistance of IBM SPSS Statistics 26 software. The prerequisite tests conducted include: validating the effectiveness of academic management information system questionnaire items based on website implementation, reliability testing, normality testing, paired t-test hypothesis testing, and N-Gain testing.

3 Result and Discussion

3.1 Result

The normality test is a method used to determine whether the academic management outcomes after implementing a website-based academic management information system are normally distributed or not. The Kolmogorov-Smirnov test is the method used to perform the normality test, utilizing the SPSS 26 software for Windows. The hypothesis posited is that the data are considered normally distributed if the significance value (Asymp.sig) is greater than 0,05, while the data are deemed non-normal if the significance value (Asymp.sig) is less than 0,05. The results of the normality test conducted on the field test of the extensive area are presented in Table 1 as follows:

Table 1. Normality Test Results for the Wide Field Trial

		Unstandardized Residual
N		312
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	5.07386424
Most Extreme Differences	Absolute	.041
	Positive	.025
	Negative	-.041
Test Statistic		.041
Asymp. Sig. (2-tailed)		.200[c,d]

From the results in Table 1, it can be seen that the pretest and posttest data have a significance probability value of 0.200. This figure indicates that the value is greater than 0.05, which can be interpreted as the pretest and posttest data in the extensive field test are normally distributed.

The subsequent test involves conducting a paired sample t-test to establish a significant difference between the pretest and posttest values of the academic management information system based on the website's effectiveness in the field testing. The statistical analysis of the paired sample t-test is conducted using SPSS 26 for Windows, with the following results:

Table 2. Descriptive Data of Paired Sample T-Test for Wide Field Testing

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	83.5994	312	3.71359	.21024
	Posttest	112.9231	312	5.11104	.28936

Table 2 displays the summary of descriptive statistical results for the pretest and posttest conducted during the extensive field test. The pretest shows a mean score of 83.5994 and a standard deviation of 3.71359, while the posttest has a mean score of 112.9231 and a standard deviation of 5.11104.

Based on the mean scores of both pretest and posttest, it can be inferred that there is a significant difference between the effectiveness of using a website-based academic management information system before and after implementation. To further validate the impact of this system on the academic management effectiveness of SMA Negeri 9 Banda Aceh, refer to Table 3 below:

Table 3. Significance (2-tailed) Paired Sample T-Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest – Posttest	-29.32372	6.66958	.37759	-30.06667	-28.58076	-77.660	311	.000

Based on the results of the T-test (paired T-Test) in Table 3, a sig. (2-tailed) value of 0.000 was found, indicating that sig. (2-tailed) < 0.05. Therefore, it can be concluded that Ha is accepted, and it can be inferred that there is a difference in the average pretest and posttest results. Consequently, the implementation of a web-based academic management information system is effective in improving academic management at SMA Negeri 9 Banda Aceh.

The effectiveness test results, in accordance with the N-gain score criteria table, indicate a mean percentage N-gain score of 65.68%. Based on the analysis, the academic management information system, based on the website, is considered to be reasonably effective in improving academic management compared to before treatment was administered. This conclusion is based on the effectiveness level categories for academic management information systems based on a website, where N-gain (g) scores < 40 are considered ineffective, scores between 40-55 are categorized as less effective, scores between 56-75 are deemed to be moderately effective, and scores >76 are considered highly effective [11]. The N-Gain test results, obtained from 312 respondents, were analyzed using IBM SPSS Statistics 26 via a one group pretest-posttest design. A descriptive summary of the findings is presented in Table 4 below:

Table 4. Descriptive Statistical Values

	N	Minimum	Maximum	Mean	Std. Deviation
N_Gain_Score	312	.23	.90	.6568	.015
N_Gain_Persent	312	22.50	89.74	65.6821	12.36457
Valid N (listwise)	312				

Based on the findings in Table 4, the mean score obtained for N-Gain Score is 0.6568. This value falls between 0.3 to 0.7, indicating moderate effectiveness of the academic management information system implementation based on the website towards improving school academic

management. On the other hand, the mean value for N-Gain Percent is 65.68%, which falls within the range of 56-75% according to the effectiveness index criteria. Therefore, this value is considered moderately effective.

3.2 Discussion

The implementation of a web-based academic management information system in improving academic management effectiveness at SMA Negeri 9 Banda Aceh is conducted through the following phases: planning, execution, and evaluation.

A. Planning of Academic Management Information System Based on Website

Academic planning at SMA Negeri 9 Banda Aceh is documented in various forms such as school profile, teacher data, student data, and teacher activity data. An academic management information system based on a website would provide flexibility to adapt to changes and educational technology needs, ensuring that the system remains relevant and effective. The planning of academic management information systems involves identifying the needs of educational institutions such as teachers, students, and academic staff, identifying problems, designing the system, and selecting technology. Additionally, it is necessary to ensure that policies are in place to protect personal data. To facilitate the planning phase, relevant data such as student data, teacher data, curriculum data, class schedules and teacher activities would be collected.

B. Implementation Management of Academic Management Information System Based on Website

The process of implementing an academic management information system based on a website is a crucial step following the planning stage. In the context of academic management, the implementation of an information system is of utmost importance. The implementation process begins by creating user accounts for teachers and students, followed by forming an implementation team consisting of administrators with their respective responsibilities and roles. In the implementation context, the school principal serves as an instructional leader who drives and assigns tasks to the implementation team. At this stage, the primary elements in the implementation process include human resources, system establishment, and the availability of facilities.

C. Evaluating the Management of Academic Information System Based on Website

The evaluation process at SMA Negeri 9 Banda Aceh is an activity to ensure that the academic information system based on the website functions well, meets user needs, and will continue to grow over time. The evaluation is carried out by improving system quality, measuring user satisfaction, identifying problems, and measuring operational efficiency. Apnilelawati et al. (2022) [12] explain that by identifying errors and shortcomings, appropriate solutions can be easily found. The evaluation analysis is conducted on all components of the educational institution.

The academic information management system should be the backbone of realizing updated information [13]. It is an interaction between elements in the academic environment to produce information that is then used as a basis for decision-making and actions, both by external parties and internal school parties. Zamroni (2020) [14] explains that the implementation of the information management system is essential in educational institutions. The implementation of the system will provide positive impacts on the school, such as supporting the learning process, providing optimal educational services, and providing learning support facilities by integrating computers.

Furthermore, Loryana & Syahidul (2021) [15] state that the information management system is essential to be implemented in line with the development of information and communication technology today. The information management system can overcome the obstacles of implementing the manual academic information system. Some of these obstacles include the lack of database storage media in storing school administration data and the ineffective and inefficient dissemination of information to students and the public. The implementation of the information management system can become a media for conveying various information and communication related to the school, which can be done without any distance and time constraints for all users.

4 Conclusion

Based on the results of the data analysis test conducted, we conclude that the implementation of a web-based academic management information system is capable of improving academic management effectiveness by 65.68% based on the N-Gain percentage. These results indicate that the N-Gain value falls within the range of 0.3 to 0.7, indicating a moderate category. This means that the implementation of a web-based academic management information system can be considered quite effective in enhancing school academic management. Additionally, the mean N-Gain percentage obtained is 65.68%, which falls within the index criteria of N-Gain effectiveness of 56-75%, indicating a moderately effective category.

Based on the management concept of academic information systems through website-based platforms at SMA Negeri 9 Banda Aceh, the system consists of planning, execution, and evaluation phases. The planning phase involves identifying needs by collecting required data such as student data, teacher data, curriculum data, schedule, and teacher activities. The execution phase commences with the creation of user accounts for teachers and students, followed by forming an implementation team, including an administrator with specific responsibilities and roles. The final step is the evaluation phase, which ensures that the academic information system based on the website is functioning well, fulfilling user needs, and will continue to evolve over time.

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