ENHANCING ACADEMIC DATA MANAGEMENT AND LECTURERS' WORK PERFORMANCE: AN EVALUATION OF THE COURSE PLANNER PLATFORM IN IPUO

Haniza Norlin Md. Yusof[1], Nalanie Raja Gobal[2] and Seri Kartini Juraimi[3]

[123]*General Studies Department, Ungku Omar Polytechnic, Malaysia*
[1]*hanizanor@puo.edu.my*
[2] *nalanie@puo.edu.my*
[3]*serikartini@puo.edu.my*

ARTICLE INFO

Article history:
Received
10 May 2023
Received in revised form
30 June 2023
Accepted
28 July 2023
Published online
31 July 2023

***Keywords**:*
academic data management; academic information system; streamline academic administrative processes; teaching staff work performance

ABSTRACT

This study was carried out to improve the effectiveness of existing academic information system called Integrated Politeknik Ungku Omar System (iPUO) at Ungku Omar Polytechnic. It aims to evaluate the effectiveness of the Course Planner (CP) platform addition in the iPUO system to address records management issues, improve time efficiency, enhance quality of work and improve lecturers' satisfaction. CP platform combines the course outline (CO) and student attendance record modules to provide a user-friendly interface for lecturers to update attendance records and reflection notes after each class session during the semester. A quantitative study was conducted using a purposive sampling method. Data was collected through online questionnaire which is constructed by adapting the Technology Acceptance Model (TAM). The survey was conducted among 113 lecturers who were the iPUO users as participants. Data analysis was done using percentage calculations. The research findings highlight the positive impact and effectiveness of the CP platform in addressing records management issues, improving time efficiency, enhancing quality of work and meeting lecturers' needs at iPUO. The CP platform has proven its ability to streamline administrative tasks, increase efficiency and enable effective academic operations.

1. Introduction

Academic institutions strive to provide efficient and effective educational experiences for their students, faculty members, and administrators. In the modern digital age, academic institutions are increasingly adopting technology-driven solutions to improve efficiency, streamline administrative processes, and enhance the overall educational experience. Efficient and effective educational experiences for students, faculty members, and administrators encompass various elements that contribute to a successful learning environment. In order to achieve the above-mentioned goals, academic institutions often turn to technology-driven solutions such as academic information systems (Duţă &

Martnez-Rivera, 2015, Indrayani, 2013; Utomo et al., 2017; Bon et al., 2018) which integrate various components of academic management into a cohesive platform. Higher education institutions have seen significant changes in the way they conduct their daily activities related to supporting students after the installation of these academic information system (Duţă & Martnez-Rivera, 2015). These systems integrate various components of academic management into a cohesive platform, streamlining processes and enhancing overall efficiency. An academic information system is a collection of procedures and methods used in higher education institutions to organize, process, and utilise information (Indrayani, 2013; Utomo et al., 2017; Bon et al., 2018). The adoption of ICT raises management quality, which in turn raises service quality (Khanam et al., 2013). Different Academic Information Systems (AISs) have been established to support daily operations as a result of ICT adaptation, which has been proved to improve working efficiency in various higher education institutions (Mahenge & Sanga, 2016).

Ungku Omar Polytechnic (UOP) has used Academic Information System (AIS) called iPUO to streamline and enhance various administrative tasks associated with academic operations. iPUO is a centralized platform that enables lecturers and administrators to efficiently manage student-related data, such as attendance records, grading, and course reflections. One major benefit of the iPUO is its ability to mark attendance digitally, eliminating the need for manual paper-based processes. This feature significantly reduces administrative workload and enhances accuracy in attendance records, making it easier to monitor student attendance patterns and identify any issues promptly. iPUO also allows lecturers to provide reflections or comments on their lessons. This feature helps in evaluating teaching methodologies, identifying areas for improvement, and facilitating ongoing professional development.

However, despite these advantages, iPUO has several drawbacks that hinder its effectiveness in achieving its goals and objectives. These drawbacks impact various aspects of the system's functionality and overall performance. Here are some key areas of challenges with iPUO:

(a) Inconsistent Teaching and Learning Hours;
One of the drawbacks affecting iPUO's effectiveness is the inconsistency between the actual teaching and learning hours and the required hours specified by the syllabus. The inconsistency happens because lecturers have to key-in the teaching and learning hours manually and it leads to insufficient coverage of course content or excessive time allocation for certain topics. As a result, students may not receive the intended depth of knowledge and skills, potentially affecting their academic performance and readiness for future endeavours.

(b) Errors in Dates of Teaching and Learning;
Lecturers are required to key-in the dates and time of teaching and learning manually in iPUO. The manual insertion of dates and time of teaching and learning activities sometimes cause human errors i.e. inserting date and time which are inconsistent with given official timetable. The inconsistent data entry can lead to confusion and inaccuracies in tracking and managing educational progress. Lecturers, students, and administrators may struggle to coordinate their activities and keep track of important milestones or deadlines. Such errors can disrupt the overall flow of teaching and learning, impacting the effectiveness of the educational process.

(c) Inaccurate Course Outline Remarks;
Another drawback is the occurrence of errors in filling in the course outline remarks at incorrect dates. This can result in inaccurate documentation of crucial information such as lesson reflections, updates, or additional resources. Inaccurate remarks can create confusion among lecturers and students, making it challenging to understand and follow the intended course structure and objectives. This can impact the effectiveness of teaching and learning, as well as the overall quality of educational delivery.

(d) Data Integrity and Reliability:
The presence of errors in data entry and inconsistent information can compromise the integrity and reliability of academic data within iPUO. Inaccurate data can lead to incorrect assessments, grading, and reporting, which can have significant consequences for academic decision-making and evaluation processes. It becomes challenging for lecturers, administrators, and other stakeholders to rely on the system for accurate and dependable information.

(e) Lecturer Dissatisfaction and Work Performance;
The drawbacks in iPUO's effectiveness also have implications for lecturers' satisfaction and work performance. Frustration and dissatisfaction may arise due to the challenges faced with the system, including data entry errors, inconsistencies in course information, and difficulties in utilizing the platform. Such drawbacks somewhat affect lecturers' ability to effectively plan, deliver, and evaluate teaching, potentially impacting their overall performance and dedication to their roles.

Therefore, Course Planner (CP) platform is designed to address the above-mentioned drawbacks faced by the administrators and lecturers in using the Integrated Politeknik Ungku Omar System (iPUO). CP is developed using the PHP programming language, connecting to a SQL-based database. This allows users to access this innovative Course Planner online. CP combines the Course Outline (CO) and student attendance record under a single interface, making it easier for lecturers to update student attendance and reflections on the CO after each teaching and learning session throughout the semester. CP also automates the procedure of updating the student attendance record, where lecture dates are automatically scheduled. Lecturers no longer need to manually input lecture dates, which reduce the errors in date entry. The reflection section is also included within the same tab as the attendance record, saving lecturers' time to going back and forth between two tabs; Course Outline and student attendance record.

It offers a centralized platform where faculty members and administrators can effectively plan, organize, and manage courses, ensuring a well-structured and coordinated curriculum. Additionally, CP enables the tracking of student attendance, enabling institutions to monitor and address attendance issues proactively. The integration of CP within the larger iPUO system creates an ecosystem where academic processes and information flow seamlessly, contributing to a more efficient and effective educational environment.

This paper aims to evaluate the effectiveness of the Course Planner platform within the integrated iPUO and its impact on the academic ecosystem. The evaluation of the Course Planner platform within the iPUO aims to assess its effectiveness and the impact it has on the academic ecosystem by analyzing the platform's features, usability, and user satisfaction.

2. Materials and Methods

This study is quantitative in nature and adopted the survey research design i.e., a cross-sectional survey design. This design is adopted because it is aligned with the aim of the study and effective for providing a glimpse of the CP users' attitudes and perceptions (Mills et al. 2019). The primary data collection instrument is a questionnaire. It was constructed by adapting the Technology Acceptance Model (TAM) developed by Venkatesh (2008). The questionnaire was designed to elicit data related to participants' attitudes, perceptions, and acceptance towards the Course Planner platform. The data collection method employed was an online survey using a Google Form. The survey questionnaire was distributed to the respondents electronically via mail, allowing for convenient and efficient data collection. This is because it is inexpensive, easy to target the respondents and offers prompt result (Mills et al. 2019). The sampling technique employed was purposive sampling, which involved deliberately selecting respondents who are considered relevant and representative of the target population (Mills et al. 2019). The study participants were selected based on two main criteria which are participants who experienced using iPUO before and after the introduction of CP. In this case, 113 teaching staff members who have experience using iPUO before and after the introduction of CP platform were selected as respondents. The data analysis method utilized was the percentage calculation. The collected survey responses were analyzed by calculating the percentage of participants who answered according to the 4-likert scale questionnaire i.e., strongly disagree, disagree, agree, and totally agree. The 4-likert scale questionnaire was developed to elicit definitive responses of participants' attitudes, perceptions, and acceptance towards the CP platform. The collected data was analyzed using a percentage calculation method to uncover patterns and trends. The findings of this study will contribute to enhancing the CP platform and improving the overall academic operations within the institution.

3. Results

This section provides a comprehensive overview of the data collected from the survey questionnaire administered to the teaching staff members. The results section begins with an overview of the response rate and participant characteristics to establish the representativeness of the sample. Descriptive statistics will be provided to present a quantitative summary of participants' responses to the questionnaire items. This will include frequencies and percentages, allowing for a comprehensive understanding of the participants' perceptions and experiences with the CP platform. The analysis aims to gain insights into their perceptions, attitudes, and acceptance of the CP platform.

3.1 Reduced Errors

The utilization of the CP module within the iPUO system has resulted in the reduced errors in recording the number of hours, dates of teaching and learning activities, and inaccuracies in documenting reflection entries on incorrect dates within the iPUO system. CP manages to overcome the following drawbacks:

i. Inconsistencies in recording the number of teaching and learning hours.
ii. Inaccuracies in recording teaching and learning dates.
iii. Writing reflections on incorrect dates.

The finding from the survey shows that 96.2% respondents agreed that they do not have to key

in each teaching and learning date and total teaching and learning hours manually. This indicates that the problems with inconsistencies in recording the number of teaching and learning hours and inaccuracies in recording teaching and learning dates are reduced.

In addition, the finding also shows that 98.5% of the respondents agreed that the automatic generation of teaching hours and dates based on the lecturers' timetables eases the record management. This feature reduced the problem of writing reflections on incorrect dates. The findings are shown in the table 1 below:

Table 1. Excerpt of Survey Analysis

No	Item	Strongly disagree	Disagree	Total	Agree	Totally Agree	Total
1.	After using 'Course Planner' I do not have to key-in the teaching and learning dates and total number of teaching and learning in the absenteeism record tab manually	0.8%	1.5%	2.3%	27.3%	70.5%	97.7%
2.	The use of 'Course Planner' eliminates errors in keying in the teaching and learning dates and total number of teaching and learning.	0%	3.8%	3.8%	25.8%	70.5%	96.2%
3.	The automatic generation of teaching and learning dates eases me to update the absenteeism record and teaching and learning remarks.	0%	1.5%	1.5%	28.8%	69.7%	98.5%

3.2 Time Saving

The use of CP has resulted in time saving for lecturers in updating attendance records and reflection entries of teaching and learning activities. This is attributed to the utilization of the CP module, which has reduced the steps required to update both records within the iPUO system. Prior to the implementation of the CP module, lecturers had to go through 16 steps to update attendance records, which consumed a considerable amount of time. However, after the use of the 'Course Planner' module, lecturers only need to go through 8 steps to update both records simultaneously without the need to navigate to another tab. See table 2 for the steps involved before and after the use of CP:

Table 2. Steps involved before and after the use of CP.

Steps involved before using CP	Steps involved after using CP:
1. Start - login & select user role. 2. Click tab teaching & learning and click attendance. 3. Click update absenteeism record for the respective class. 4. Select day, month & year. 5. Select time. 6. Click add meeting. 7. Date slot added. 8. Click pencil icon to update the absenteeism record. 9. Look for student name and mark 0 or K if the student is absent or absent with exemption. 10. Click OK to update. 11. Click OK to verify the update. 12. Click tab E-FRP. 13. Select course outline tab. 14. Select course. 15. Select teaching and learning date. 16. Write teaching & learning remarks & update. - End	1. Start - login & select user role 2. Click E-FRP 3. Click tab Course Planner 4. Select class section & course outline 5. Click the pencil on the day & date of the class 6. Select update absenteeism record & reflection or reflection only 7. Mark 0 or K and scroll down to update reflection 8. Click OK to update - End

3.3 Quality of Work Procedures

The implementation of the CP module has enhanced the quality of work for lecturers in terms of updating and storing quality records. This is because the finding depicts that 94.7% of the

respondents agreed that the use of CP has increased the quality of their work output. Furthermore, nearly three-quarter of the respondents agreed that the appearance of the updated date and time stamps in the teaching and learning reflection section in CP motivated them to update the teaching and learning reflections right after their lessons. Finally, the enhanced quality of work for lecturers also can be seen in the time saved by the lecturers. This is because nearly 100% of the respondent agreed that updating the absenteeism record and reflection remarks of teaching and in CP saved their time.

Table 3. Excerpt of Survey Analysis

No	Item	Strongly disagree	Disagree	Total	Agree	Totally Agree	Total
6.	The use of 'Course Planner' increases the quality of my work output because the absenteeism record and teaching and learning reflection remarks tabs are placed at the same interface.	0%	5.3%	5.3%	28.8%	65.9%	94.7%
7.	The appearance of the updated date and time stamps in the teaching and learning reflection section in 'Course Planner' motivates me to update the teaching and learning reflections right after my lessons.	9.8%	15.9%	25.7%	33.3%	40.9%	74.3%
8.	The use 'Course Planner' saves my time to update the absenteeism record and reflection remarks of teaching and learning.	0%	0.8%	0.8%	34.1%	65.2%	99.2%

3.4 Level of Lecturer Satisfaction

The survey and interviews conducted with lecturers who use the CP module have indicated a high level of satisfaction, with overall positive feedback regarding its usage. A total of 96.2% of the respondents agreed that they like using CP. In addition, lecturers' satisfaction also can be seen in their motivation and their perception over the ease of CP use. This is because, nearly 100% of the respondents agreed that the use of CP eased their teaching and learning activities record management and almost three-fourth of the respondents agreed that the appearance of updated date and time stamps in the teaching and learning reflection section in CP platform motivates them to update the teaching and learning reflections right after their lessons.

Table 4. Excerpt of survey analysis

No	Item	Strongly disagree	Disagree	Total	Agree	Totally Agree	Total
3.	The automatic generation of teaching and learning dates eases me to update the absenteeism record and teaching and learning remarks.	0%	1.5%	1.5%	28.8%	69.7%	98.5%
4.	The use of 'Course Planner' eases me to write teaching and learning reflections and update the attendance record simultaneously because both items are placed at the same tab.	0%	0.8%	0.8%	25.8%	73.5%	99.2%
7.	The appearance of the updated date and time stamps in the teaching and learning reflection section in 'Course Planner' motivates me to update the teaching and learning reflections right after my lessons.	9.8%	15.9%	25.7%	33.3%	40.9%	74.3%
9.	I like using 'Course Planner' because I do not make mistakes while keying-in the dates and the total number of teaching & learning.	0%	3.8%	3.8%	36.4%	59.8%	96.2%

3.5 Lecturers' Complaints

Several complaints raised by lecturers during the problem identification phase of the feedback process have been addressed and eliminated through the use of the CP module. The complaints were as follows:

i) Keying-in the teaching and learning dates and time manually for absenteeism record is time consuming.

ii) The placement of the teaching and learning absenteeism record tab and course outline tab involves more steps and requires more time to update.

iii) The errors made while keying-in teaching and learning dates and time and lesson remarks in the course planner.

Table 5. Excerpt of Survey Analysis

No	Item	Strongly disagree	Disagree	Total	Agree	Totally Agree	Total
8.	The use 'Course Planner' saves my time to update the absenteeism record and reflection remarks of teaching and learning.	0%	0.8%	0.8%	34.1%	65.2%	99.2%

3.6 Value Added in Quality Control

The utilization of the CP module has created value in quality control. This is attributed to the presence of time and date stamps (see Figure 3) that are generated after lecturers update their reflection entries in the CP module. These timestamps motivate lecturers to update their reflection entries immediately after the teaching and learning activities have concluded.

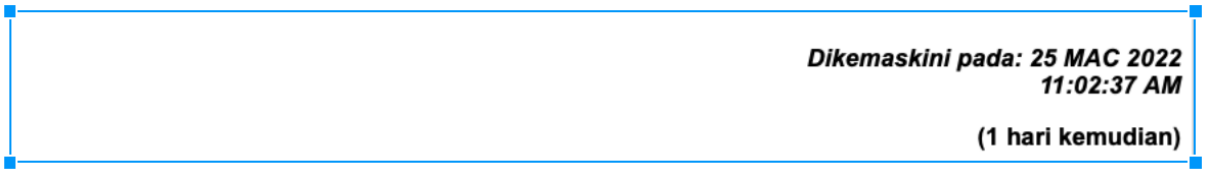

Figure 1. Time and date stamps available in CP

Table 6. Excerpt of Survey Analysis

No	Item	Strongly disagree	Disagree	Total	Agree	Totally Agree	Total
7.	The presence of time and date stamps that are generated after lecturers update their reflection entries in the 'Course Planner' module motivate me to update the reflection as soon as I have completed my teaching and learning sessions.	9.8%	15.9%	25.7%	33.3%	40.9%	74.3%

4. Discussion

The section provides an in-depth analysis and interpretation of the results obtained from the survey conducted on the usage of the Course Planner platform. This section aims discuss the various aspects of the platform's usage and its impact on academic operations within UOP with the support of existing academic literatures. The following key points are discussed based on the survey results:

4.1 Effectiveness in addressing errors in quality record

The implementation of the Course Planner platform has effectively addressed the previously identified issues related to errors in recording the number of teaching and learning hours, dates, and reflection entries. The automated features of the Course Planner, such as the automatic generation of teaching hours and dates based on the lecturer's schedule, have significantly reduced errors in the record management. This finding is in line with the claims given by other existing academic studies. The studies found that Student Information System (SIS) can improve data accuracy and reduce errors in academic records by providing a centralized store for student data (Miller, 2023) and leads to more objective education-enhancement decisions

(Ngoma and Candidate, 2009). On the other hand, the utilisation of Academic Information System (AIS) has proven to be beneficial and effective for the quality of service to both students (Iswan et. al., 2022), staff and decision making (Kayanda et al., 2020).

4.2 Time efficiency and streamlined processes

The CP platform has proven to be a time-saving tool for lecturers in updating attendance records and reflection entries. The reduced number of steps required for record updates has streamlined the process and eliminated the need to navigate to different tabs or interfaces. This improvement has enhanced efficiency in managing academic records. This finding is consistent with the assertions made by other studies. According to Blackbaud, a student information system (SIS) can save time for both students and faculty by providing online attendance records. This feature allows students and faculty to easily review attendance history, eliminating the need for manual record-keeping and saving time in updating attendance records (Student Information System (SIS) Software, n.d.). Furthermore, the automated attendance systems save time for both lecturers and students by eliminating the need for manual record-keeping and reducing errors in attendance tracking (Admin, 2022). AIS also can help lecturers organize their reflection entries and retrieve them when needed. With features such as tagging, categorization, and search functionalities, lecturers can easily locate specific reflection entries based on topics, dates, or other criteria. This saves time and allows for a more systematic approach to reflection (Facilitating Reflection: A Manual for Leaders and Educators Facilitating Reflection a Manual for Leaders and Educators, n.d.)

4.3 Improvement in work quality

The implementation of the CP has contributed to the enhancement of lecturers' work quality. The platform's features, such as the inclusion of timestamps for reflection entries, have motivated lecturers to update their entries promptly after each teaching and learning session. This timely updating ensures accurate and comprehensive record-keeping, positively impacting work quality. This finding supports the claim made by Iswan et al., (2022) that the use AIS enhances the quality of service provided to students, leading to improved student outcomes (Iswan et al., 2022).

4.4 Lecturer satisfaction and user acceptance

The survey results indicate a high level of satisfaction among lecturers using the CP platform. The majority of respondents expressed positive feedback and a liking for the platform's features and functionalities. The user acceptance of the CP platform further confirms its effectiveness in meeting lecturers' needs and expectations. This finding corroborates with the previous studies conducted by Kayanda et al., (2020) Elshami et al., (2021) and Iswan et al., (2022) that the use of AIS heightens the users' satisfaction level.

4.5 Addressing lecturers' complaints

The CP platform has successfully addressed and resolved various complaints raised by lecturers. The platform's features and streamlined processes have eliminated the identified issues, enhancing lecturers' overall experience and work satisfaction. This finding is consistent with the claim pointed out by Awan Setiawan et al., (2022) that the utilization of AIS can streamline processes, improve data quality, and enhance the overall experience of lecturers and staff. Similarly, Kayanda et al., (2020) suggest that AIS usage can eliminate identified issues and enhance the overall experience and work satisfaction of lecturers and staff.

4.6 Value addition in quality control

The CP platform has added value to quality control measures. The presence of timestamps for reflection entries motivates lecturers to update their entries immediately after teaching and learning sessions, ensuring accurate and timely record-keeping. This value addition contributes to maintaining and improving the quality of academic operations. This finding supports the claims made by two studies. The study carried out by Bharati & Berg, (2003) suggests that AIS has a positive impact on service quality which i.e., it contributes to quality control measures by ensuring accurate and reliable information. Similarly, Iswan et al., (2022) claim that that the utilization of AIS adds value to quality control measures by improving information management and enhancing service delivery.

5. Conclusion

The conclusion of this research study highlights the significant positive impact and effectiveness of the Couse Planner (CP) platform in overcoming various challenges related to records management. The survey results provide compelling evidence that the implementation of CP has successfully reduced errors in recording the number of teaching and learning hours, dates and reflection entries. Lecturers no longer need to enter these details manually as the platform automates the process based on their schedules. This automation has significantly reduced the error rate and provides more accurate and reliable record management.

In addition, the CP platform has proven to be a valuable tool for improving time efficiency within the academic institution. By streamlining the process of updating attendance records and reflection entries, the platform has significantly reduced the number of steps required for these tasks. Lecturers no longer have to navigate through multiple tabs or interfaces, resulting in time savings and increased productivity. This improvement in time efficiency has a direct impact on the overall efficiency of academic operations, allowing lecturers to manage their time more effectively and focus on other important tasks.

Another important outcome is the improvement in the quality of work achieved through the use of the CP platform. The inclusion of timestamps for reflection entries has motivated lecturers to promptly update their records after each teaching and learning session. This timely updating ensures the accuracy and completeness of the records, which ultimately contributes to better quality of work. The CP platform enables lecturers to keep more organised and detailed records, which allow for better monitoring and evaluation of their teaching performance.

In addition, the survey results show a high level of satisfaction among lecturers who have used the CP platform. The positive feedback and appreciation for the features and functions of the platform show that it meets the needs and expectations of lecturers. This high level of user satisfaction is a strong indicator of the platform's success in providing a user-friendly and intuitive interface that facilitates efficient records management and overall academic operations.

References

Admin, C. (2022, August 18). 7 Benefits of Student Attendance Tracking Software for Schools. Classter. https://www.classter.com/blog/edtech/student-information-systems/attendance-tracking-software-schools/

Awan Setiawan, Iman Sudirman, Nurman Helmi, Erwin Yulianto, & Ruhanda. (2022). Strategy for the Effectiveness of the Implementation of Academic Information Systems in College in Efforts to Improve Information Quality. *International Journal of Interactive Mobile Technologies (IJIM)*, *16*(13), 30–47. https://doi.org/10.3991/ijim.v16i13.30601

Bharati, P., & Berg, D. (2003). Managing information systems for service quality: a study from the other side. Information Technology & People, 16(2), 183–202. https://doi.org/10.1108/09593840310478685

Bharamagoudar, S. R., Geeta, R. B., & Totad, S. G. (2013). Web based student information management system. *International Journal of Advanced Research in Computer and Communication Engineering*, *2*(6), 2342-2348.

Duţă, N. & Martínez-Rivera, O. (2015). "Between theory and practice: the importance of ICT in Higher Education as a tool for collaborative learning". Procedia - Social and Behavioral Sciences, vol.180, pp. 1466-1473.

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges. *Medical Education Online*, *26*(1), 1920090. https://doi.org/10.1080/10872981.2021.1920090

Facilitating Reflection: A Manual for Leaders and Educators Facilitating Reflection A Manual for Leaders and Educators. (n.d.). https://www.uvm.edu/~dewey/reflect.pdf

Indrayani, E. (2013). "Management of Academic Information System (AIS) at Higher Education in the City of Bandung". Procedia - Social and Behavioral Sciences, vol.103, pp. 628 – 636

Iswan, I., Bahar, H., Ismah, I., & Lestari, S. M. (2022). The Effectiveness of Academic Information System Utilization and Digital Literacy as the Efforts to Improve Students' Service Quality. *Journal of Education and Training*, *9*(2), 22. https://doi.org/10.5296/jet.v9i2.19529

Kayanda, A., Busagala, L., & Tedre, M. (2020). User perceptions on the use of Academic Information Systems for decision making support in the context of Tanzanian Higher Education. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, *16*, 72–87. https://files.eric.ed.gov/fulltext/EJ1254826.pdf

Khanam, S., Siddiqui, J. & Talib, F. (2013). "Role of Information Technology in Total Quality Management: A Literature Review". International Journal of Advanced Research inComputer Engineering and Technology (IJARCET), vol.2, no.8.

Mahenge, M. P. J., & Sanga, C. (2016). "ICT for e-learning in three higher education institutions in Tanzania". Knowledge Management & E-Learning: An International Journal, vol.8, no.1, pp. 200-212.

Miller, S. (2023, March 30). Modernize Higher Education with Student Information Systems [Review of Modernize Higher Education with Student Information Systems]. Software Advice. https://www.softwareadvice.com/resources/what-is-a-student-information-system/ a student information system (SIS) can improve data accuracy and reduce errors in academic records by providing a centralized store for student data

Mills, G. E., & Gay, L. R. (2019). *Educational research: Competencies for analysis and applications*. Pearson. One Lake Street, Upper Saddle River, New Jersey 07458.

Mulyapradana, A., Hakim, M., Anjarini, A. D., Elshifa, A., & Huda, S. T. (2021, August). Implementation of the Academic Information System (SIAKAD) and the Quality of Academic Services on User Satisfaction mediated Decision Making (Case Study on 3 PTS in Pekalongan Residency Area). In *International Conference on Innovations in Social Sciences Education and Engineering (ICOISSEE)* (Vol. 1, No. 1, pp. 173-185).

Ngoma, S., & Candidate. (2009). *An Exploration of the Effectiveness of SIS in Managing Student Performance 1 AN EXPLORATION OF THE EFFECTIVENESS OF SIS IN MANAGING STUDENT PERFORMANCE An Exploration of the Effectiveness of SIS in Managing Student Performance*. https://files.eric.ed.gov

Student Information System (SIS) Software. (n.d.). Blackbaud. https://www.blackbaud.com/solutions/organizational-and-program-management/student-information

Philip Kotler dan Kevin Lane Keller, (2009). Manajemen Pemasaran, Penerbit: Erlangga. Jakarta. Indonesia

Utomo, H.P., Bon, A.T. & Hendayun, M. (2017) Academic Information System Support in the Era of Education 3.0. In IOP Conference Series: Materials Science and Engineering (vol. 226, no. 1, p. 012190). IOP Publishing.

Utomo, H.P., Bon, A.T. & Hendayun, M. (2018). The integrated academic information system support for education 3.0 in higher education institution: Lecturer perspective. In Journal of Physics: Conference Series (vol. 1049, no. 1, p. 012102). IOP Publishing.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, *39*(2), 273-315.

Villegas-Ch, W., García-Ortiz, J., Mullo-Ca, K., Sánchez-Viteri, S., Roman-Cañizares, M. (2021). Implementation of a Virtual Assistant for the Academic Management of a University with the Use of Artificial Intelligence.