AcadTrack: Development and Assessment of Learner's Academic Performance Tracking System with Decision Support

Nicolas, Prince Mert O. [1]*

[1]*Nueva Ecija University of Science and Technology, Cabanatuan City, Nueva Ecija, 3100, Philippines
princemertnicolas@gmail.com

Abstract. The study, "AcadTrack: Development and Assessment of Learner's Academic Performance Tracking System With Decision Support," aimed to digitalize the manual Student Tracking System at the College of Information and Communications Technology, Nueva Ecija University of Science and Technology. It involved development and assessment phases, utilizing the Software Development Life Cycle (SDLC) for creation—encompassing planning, designing, coding, testing, and deployment. IT experts evaluated its technical aspects, while the Guidance Coordinator and Class Advisers examined its functional characteristics and effectiveness, all against ISO 25010 Software Quality Product Standards. The system was found to be suitably functional, efficient, compatible, usable, reliable, secure, maintainable, portable, and effective. The study suggests further integration with university-wide records for comprehensive performance tracking.

Keywords: Academic Performance, Functional Characteristics, ISO 25010, Software Development Life Cycle, Technical Characteristics

1. Introduction

Grades serve as vital indicators of student performance, impacting academic journeys and graduation timelines. Technological advancements have transformed grade dissemination, with institutions adopting Enrolment Systems and Online Grade Portals to enhance efficiency and accessibility. However, enrolment trends often reveal deeper issues affecting student retention, necessitating proactive measures to address challenges like financial difficulties and inadequate preparation. Teachers play a pivotal role in monitoring student progress and implementing interventions to prevent dropouts. Integration of Learner's Academic Performance Tracking Systems with Decision Support is crucial for identifying at-risk students and providing targeted interventions. The Nueva Ecija University of Science and Technology employs a Student Tracking

Process, yet lacks intervention suggestions, highlighting the need for a Decision Support Algorithm to enhance retention efforts. This study aims to utilize data analysis and interventions generated by the software to improve student success and retention rates.

Tracking in education, also known as streaming or phasing, involves grouping students based on academic ability for specific subjects or curricula within a school. This practice encounters challenges in higher education due to distractions like online gaming and social media, as well as varying backgrounds and capacities among students. Implementing a robust tracking system is crucial to support and improve student performance amidst these challenges. The integration of Information and Communication Technology (ICT) has streamlined tracking processes, reducing paperwork and potentially creating future career opportunities for students. Modern secondary education often employs tracking to differentiate curriculum difficulty levels, influenced by school policies. Despite intentions for track assignments to be based on academic ability, other factors often influence student placement.

Student tracking systems are essential assessment tools that support ongoing learning. School counselors play a vital role in dropout prevention by implementing a range of strategies aimed at promoting academic success for all students, especially those at risk of leaving school. Dockery (2012) and Bailey (2011) highlight the importance of understanding key indicators of potential dropouts and employing interventions such as school-wide reforms, targeted assistance, support during transitions, and diagnostic tracking systems to mitigate dropout rates. Assouline (2012) suggests concrete measures including tracking systems, advocate training, academic support, social skill development, and school-wide interventions to prevent dropouts. Furthermore, the Department of Education and Training in Western Australia (2008) emphasizes strategies like communication with families and coordination with relevant agencies to restore attendance or facilitate enrolment elsewhere. The National Dropout Prevention Centre in the US provides a comprehensive summary of prevention strategies, underscoring the need for tailored programs to support students at risk effectively.

Table 1 Intervention and Strategy for Dropout Prevention

Intervention	Strategy
Academic Interventions	Tutoring, academic support, afterschool programming, service learning, accelerated credit accumulation, extra classes
Psychosocial Support	Behavioral interventions, structured extracurricular activities, life skills development, counseling, anger management, conflict resolution, addressing transitions
Family Interventions	Engaging, strengthening and/or counseling with families
Targeting High Risk Behaviors	Probation, monitoring truancy and attendance, pregnancy, teen parenting, substance abuse prevention/intervention
Adult Support	Mentoring, case management, court advocates, service coordination
School Structure and Programming	School environment, classroom climate, school reorganization, freshmen academies, professional development, systemic/policy renewal
School Curriculum	Differentiated teaching, student-focused instruction, interactive instruction, culturally or linguistically relevant instruction, high academic standards and rigorous curriculum for all students, link to career development, job training, workforce readiness

Decision support systems (DSS) play a crucial role in aiding decision-making processes, particularly in business environments, by gathering and analyzing data to present optimal solutions. Shalabi (2020) underscores the significance of accurate data, while Gupta and Harris (2020) highlight key DSS functions: information management, data quantification, and model manipulation. DSS benefits include time-saving, improved efficiency, and enhanced communication. However, Bhullar (2012) identifies deficiencies in the education system, prompting the development of models like the AcadTrack: Learners Academic Performance Tracking System With Decision Support aimed at addressing issues such as dropout prediction and student intervention. This integration of DSS principles into educational contexts reflects a broader trend of leveraging technology to improve decision-making processes across various sectors.

Retention of learners is crucial for the performance of academic institutions, necessitating strategic efforts from admission offices and guidance departments. Advisers and teachers play a key role in tracking student status and collecting essential data for retention strategies. Digitalization of this process offers comprehensive planning possibilities. Gybras (2002) introduced a patented institutional tracking system comprising various modules like school, student, academic progress, report, default management, attendance, and grades. This

system generates diverse reports including performance, attendance, and financial reports, facilitating effective retention strategies.

The developed Student Academic Performance Tracking System with Decision Support follows the Software Development Life Cycle (SDLC), encompassing planning, design, coding, testing, deployment/implementation, and evaluation stages. Inspired by Gybras's institutional tracking system, it ensures comprehensive framing and effective planning, development, and assessment. The project progresses through distinct phases: Planning involves scoping and platform/language selection; Design creates guiding diagrams; Coding constructs the system; Testing identifies and rectifies errors; Implementation deploys the bug-free system; and Evaluation assesses technical aspects by IT Experts and functionality/usability by End-Users. Once assessed and operational, the system integrates into college tracking procedures.

2. Methodology

This study employed a developmental research approach, systematically studying the design, development, and evaluation processes to create the AcadTrack: Learners Academic Performance Tracking System With Decision Support. The research progressed through two stages: development and assessment. The System Development Life Cycle (SDLC) guided the development process, spanning from planning to implementation. Following successful coding and testing, evaluation was conducted by both IT Experts and End-Users, assessing technical characteristics, functionality, usability, and overall effectiveness of the system.

2.1. Sampling Procedure

The samples of this study came from the group of people who evaluated and assessed the Student Tracking System with Decision Support based on the questionnaire provided by ISO 25010. They were grouped into IT Experts and End-Users.

2.2. Respondents

The study included five IT experts and 17 users, consisting of Guidance Coordinators and Class Advisers, as respondents. IT experts evaluated the technical aspects of the Student Tracking System with Decision Support based on

ISO 25010 standards, while Guidance Coordinators and Class Advisers assessed functionality and usability. The selection of IT experts was determined through random sampling, while all available Guidance Coordinators and Class Advisers participated in the evaluation process through total enumeration.

Table 2 Distribution of Respondents

Respondents	Number of Respondents
IT Experts	5
Guidance Coordinator	1
Class Adviser	16
TOTAL	**22**

3. Results and Discussion

3.1. Software Development Life Cycle

The Software Development Life Cycle (SDLC) for the AcadTrack: Learners Academic Performance Tracking System With Decision Support involved several key phases. In the planning phase, initial activities included interviews with the University Guidance Office and the Guidance Coordinator to understand the current tracking procedures and gather necessary information for subsequent steps. Designing the system involved creating concepts for the graphical user interface, functionalities, and database, along with assigning user roles and restrictions. The coding phase utilized programming languages such as HTML, JavaScript, PHP, and SQL, with tools like Sublime Text 3 and Xampp. Testing ensured the system's functionality and objective fulfilment, followed by evaluation by IT Experts and intended users. Finally, in the implementation phase, the AcadTrack was installed on a standalone database server, accompanied by the distribution of a User's Manual, and deployment for actual use in tracking processes at the College of Information and Communications Technology.

3.2.Evaluation of the Developed AcadTrack by the IT Experts

The results of the evaluation show that the AcadTrack conformed with the different software quality criteria of the ISO 25010 Software Product Quality Standards. These point out that the developed system is a quality product that can be applied in the college.

These results are evidence that the AcadTrack has satisfactorily met the product quality standards with no weaknesses. This is proved by the 3.75 mark attained by the system from the IT experts in all the criteria namely functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability.

The 3.75 mark is described as Highly Functional, Highly Efficient, Highly Compatible, Highly Usable, Highly Reliable, Highly Secured, Highly Maintainable and Highly Portable.

These results recommend that from the viewpoint of the IT experts, the AcadTrack is functionally suitable, performance efficient, compatible, usable, reliable, secure, maintainable and portable.

Moreover, these results proved that the AcadTrack can be utilized and can conclude that no problems if not minimal will arise since it surpasses the Software Product Quality instrument lifted in the ISO 25010. Furthermore, since these results came from the IT Experts, its description clearly demonstrates a dependable outcome.

Table 3 Summary of Evaluation of the AcadTrack by the IT Experts

Software Product Quality Categories	Weighted Mean	Verbal Description
1. Functional Suitability	3.72	Highly Functional
2. Performance Efficiency	3.88	Highly Efficient
3. Compatibility	3.91	Highly Compatible
4. Usability	3.74	Highly Usable
5. Reliability	3.75	Highly Reliable
6. Security	3.73	Highly Secure
7. Maintainability	3.56	Highly Maintainable
8. Portability	3.72	Highly Portable
Average Weighted Mean	**3.75**	

3.3.Evaluation of the Developed AcadTrack by the End Users

The results of the evaluation point out that the Guidance Coordinator and the Class Advisers were ready to take and adopt the AcadTrack. This directs that the system is highly functional, highly efficient and highly usable as per the assessment of the users. Such ratings which equate to Highly Functional, Highly Efficient and Highly Usable verbal description signify that the Guidance Coordinator and the Class Advisers found the system as exceptionally capable in meeting their need. This further suggests their approval in adopting the AcadTrack under consideration in the tracking activity. Thus, these reveal that the end-users found the AcadTrack to be functionally suitable, performance efficient and usable.

Being tested by the End-users, the high rating on the functional characteristic of the system point toward that the AcadTrack's services being offered in the tracking process of the Student Academic Performance has many contributions. Its functional suitability, efficiency and usability are the main factors that implies to provide better quality and quantity of outputs to the part of the Guidance Coordinator and the Class Advisers. Giving these set of results, the said end-users can add focus on the other areas of their line of duty such as extension and research.

Table 4 Summary of Evaluation of the AcadTrack by the End Users

Software Product Quality Categories	Weighted Mean	Verbal Description
1. Functional Suitability	3.94	Highly Functional
2. Performance Efficiency	3.67	Highly Efficient
3. Usability	3.81	Highly Usable
Average Weighted Mean	**3.80**	**Highly Functional, Highly Efficient and Highly Usable**

3.4. Evaluation on the Level of Effectiveness Upon Implementation of the

The evaluation of the AcadTrack: Learners Academic Performance Tracking System With Decision Support by the Guidance Coordinator and Class Advisers revealed its high level of effectiveness. With a weighted mean score of 3.88, the AcadTrack was rated as "Very Effective" based on criteria such as efficient record searching, updating, archiving, and retrieval, as well as providing relevant data for decision-making processes. However, areas for improvement were identified, particularly in enhancing the effectiveness of recording student information and

improving the system's ease of use and accessibility for Class Advisers. Overall, the AcadTrack was found to positively contribute to organizational processes, providing reliable performance and facilitating decision-making in the tracking process. The system's functions, including recording, analyzing, and report generation, were deemed helpful in streamlining the academic performance tracking process and reducing human errors, ultimately enhancing its effectiveness.

Table 5 Summary of Evaluation on the Level of Effectiveness of the AcadTrack

	Weighted Mean	Verbal Description
1. It searches, updates, archives and retrieves records efficiently.	3.94	Very Effective
2. It works effectively in recording Student Information.	3.76	Very Effective
3. It monitors Student's academic deficiencies.	3.88	Very Effective
4. It generates report accurately and in real-time.	3.88	Very Effective
5. It provides data and relevant information for decision-making process easily.	3.94	Very Effective
6. It provides an environment that is easy to use and access by the Class Adviser.	3.76	Very Effective
7. It provides means to easily back-up records.	3.94	Very Effective
8. It secures the files through opening and retrieval of records.	3.94	Very Effective
9. It lessens the workload of the Class Adviser by providing easier methods of manipulating records.	3.82	Very Effective
Average Weighted Mean	**3.88**	**Very Effective**

4. Conclusions

Based on the findings of the study, several conclusions can be drawn regarding the Student Academic Performance Tracking System with Decision Support. Firstly, the system was successfully developed following the stages of the Software Development Life Cycle (SDLC), demonstrating a systematic approach to its creation. Secondly, the system met the requirements outlined by the ISO 25010 Software Product Quality Standards, as evidenced by the favorable scores provided by both IT experts and end-users, including the Guidance Coordinator and Class Advisers. Thirdly, upon implementation, the system was evaluated as very effective by the Guidance Coordinator and Class Advisers, indicating its strong utility and functionality in tracking academic performance. These conclusions highlight the successful development, compliance with quality standards, and effectiveness of the Student Academic Performance Tracking

System with Decision Support, affirming its value as a tool for educational institutions in managing student performance and facilitating decision-making processes.

Acknowledgements

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