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A Dashboard-based System to Manage and Monitor the Progression of Undergraduate IT Degree Final Year Projects

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ABSTRACT

Having a system to process and store information securely is crucial for an e-learning environment in a higher learning institute. Data recorded manually is deemed unsuitable as it may lead to mishandling of documents, poor record of documents movements, and even missing documents. A final year project (FYP) subject for a particular university's course would need a specific management system to alleviate the work processes of supervision and monitor student progress. This system would reduce cost, paperwork, staffing and even simplify the workflow process. Therefore, introducing a student dashboard-based system for the FYP course is proposed in this study. This paper presents a smart system utilizing data analytics and a dashboard that enables the students to self-monitor, track progress and manage important information related to their FYP. The system development followed stepwise Rapid Application Development (RAD) methodology in developing the system. The developed system has been designed, developed, and tested by university students taking FYP courses. A Technology Acceptance Model (TAM) was adopted in the testing phase to examine the system acceptance and user behavior intention in using the proposed system. The results showed a significant effect on a positive implementation in the faculty's course management and monitoring the student's FYP progress. For the dashboard-based system to reach its full potential, it is highly recommended to implement the system in its course management fully.

Keywords: Dashboard, final year project, rapid application development, technology acceptance model

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INTRODUCTION

Leveraging an online learning tool is a significant way of delivering a course effectively. Online learning tools, such as e-learning Massive Open Online Courses (MOOC), Moodle, and learning management system (LMS), have been widely implemented in online course content. Online learning tool plays an important role in higher education. It is also beneficial for managing a student's Final Year Project (FYP) course other than being used for course delivery.

For IT students in many universities in Malaysia, the FYP is a crucial course that structured for the students to undertake in their final year before they can be graduated. The FYP course is challenging as the students need to exhibit their ability to apply the knowledge and skills throughout their tenure as undergraduate students. Moreover, they must demonstrate their proficiency in designing and developing a fully functional system at the end of the semester. This process involves several parties: the course coordinator or committee, supervisors, examiners, and the students themselves. FYP systems have been researched in the literature, for example in (Ismail et al., 2017; Khamaruddin et al., 2017); however, they are not general and limited to a specific implementation. Thus, it seems not enough to manage the project course itself. The limitation is most probably due to the following problem:

1. progress-tracking has hardly been conducted, and the current implementation processes seem not transparent enough to the students and the instructors, and data for analysis may not be supported as different parties may provide various input,
2. Students hardly manage their work, and thus, the progress of students cannot be seen and analyzed as a whole and
3. management wise where a manual process could cause inaccurate data and analysis, and the process requires much work to manage.

Following the previous research articles related to FYP in higher education, several types of FYP systems have been developed and implemented locally (within particular faculty or university use only). The FYP system is mostly related to the management and the process of FYP (Ismail et al., 2017; Khamaruddin et al., 2017; Roberts et al., 2017; Vakaloudis et al., 2020). The system includes the submission of a proposal, report, and the FYP product resources (Ismail et al., 2017; Vakaloudis et al., 2020), a platform for the coordinator, supervisors, examiners, and students to communicate with each other (Roberts et al., 2017), monitoring processes (Khamaruddin et al., 2017; Mohamed et al., 2017; Vakaloudis et al., 2020), students and supervisor's allocation as well as the evaluation process (Kar et al., 2017). For monitoring purposes, an online logbook is usually adopted, which in the logbook, the features are mainly related to supervision activities and the progress of report writing. However, it is argued that monitoring how far the software,

system, or application has been developed might not properly be captured and analyzed through the online logbook. Furthermore, less interactive applications that can provide communication between lecturers and students are available in the current FYP application. Visualizing students' progress interactively, such as using a dashboard-type application, may help to improve the learning environment (Safsouf et al., 2021). Some of the related applications from previous research works are summarized in Table 1 to comprehend the implementation of the FYP system further. The title of the existing FYP problems, the proposed system application, the users, the system functionality, and any related dashboard-type application in the system was extracted.

Among the existing application for FYP in Table 1, it can be summarized that the systems were revolving on a similar feature, which is to the FYP project management, it is related to supervisor and student project allocation, student progress tracking, logbook, and supervision monitoring, and evaluation of the project. These features are essential for providing an effective management system, particularly for administering the FYP course. Moreover, moving from a manual to a systematic approach in the era of IR4.0 is indispensable considering the advancement of technology and changes in the learning environment these days. A dashboard that can provide real-time information and support the learning experiences becomes a significant challenge to the learning environment (Safsouf et al., 2021). In managing a course, other than providing a function to ease the course management process, it is also essential to have a function that can act as a tool to communicate the work being conducted between the lecturer and the student, as well as a tool to visualize the information meaningfully (Safsouf et al., 2021; Sarikaya et al., 2019). This information will provide guidance for the student to monitor and make progress on their performance (Mehmet & Arif, 2021).

Based on the existing FYP applications in Table 1, the current dashboard-style has been implemented in some ways. For example, the systems summarize the student information (i.e., name, course, program, credit hours), the student's FYP thesis submission status, a list of work, and comments from examiners or supervisors on one page. However, the type of implemented dashboard was not designed with data semantics and with enough visual features. According to Sarikaya et al. (2019), some characteristics of a dashboard for motivation and learning, particularly that tailored to an individual's achievement, should be designed with interactive interfaces and with alert features. However, the existing FYP applications did not emphasize these elements in their application. Apart from that, following the provided solution to the problem in FYP in Table 1, one solution to the FYP problems that the existing application might not give enough attention to is the implementation of the element of progression in assessing the student's FYP performance. The implementation of progress tracking merely in the form of a list of records (Ismail et al., 2017; Mohamed et al., 2017) and submission of files (Abdulkareem et al., 2013;

Table 1

The summary of available FYP system in literature

Article	Title	Current problems	Proposed FYP System	User	Main Function/ Features	Implementation of Any kind of Dashboard types
Kar et al. (2017)	Integrated Supervision and Evaluation System for Final Year Project	The FYP was managed manually (paper-based). Several internal problems occur using a manual approach, mostly related to limited time for supervisors to update the respective students' progress. Also, a manual approach requires much effort in sorting out the student's work.	The system provides a centralized unit for all person-in-charge (PIC)	Students, supervisors, panels, and coordinator	The research offered an integrated supervision and assessment system, which could efficiently manage the FYP system.	The system has a summary of the projects in terms of student details, status on submitted final thesis, and comments from examiner were shown on one page. None of them related to FYP progression.
Abdulkareem et al. (2013)	Design and Development of a University Portal for the Management of Final Year Undergraduate Projects	The manual process sometimes leads to time-wasting, delaying progress as the students cannot update their supervisor (lecturer) on the project's accomplishment.	The system is a portal used to automate the processes associated with the management of final-year projects.	Students and supervisors.	The online system would be able to work on the following functions: identify duplication of projects systematize supervisors and students' allocation students and supervisor interaction submit reports online evaluation and feedback to students.	The portal does not show any summarization related to student details and their FYP progress.

Table 1 *(Continue)*

Article	Title	Current problems	Proposed FYP System	User	Main Function/ Features	Implementation of Any kind of Dashboard types
Chik and Rafi'i (2016)	Interactive Evaluation System for Final Year Project (FYP)	The Program Coordinator (PC) has a problem with processing the student's marks. Presently, all the marks are processed and stored manually using Microsoft Excel.	A systematic evaluation system enables the Final Year Project evaluators to evaluate the FYP during the evaluations simultaneously.	Students and evaluators.	The system enables the evaluators to log the student's scores, significantly generating the results in real-time.	The proposed system does not show any summarization of information or visualization of Information. For example, the marking system could be in the form of a table list.
Buhari et al. (2017)	A Streamlined Approach to Enhance the Capacity of Undergraduate IT Students to Deliver High Quality and Demand-Driven Final Year Project: A Conceptual Framework on Collaboration between Industry and University	They were using a manual approach to managing FYP activities. Hence, the common problems faced are poor planning and management of a project, unstructured documentation, students' problem not related to the project, and inadequate or negligent supervision.	The proposed system is a web-based system that systematizes all FYP activities.	Students and supervisors.	The system includes all student's FYP processes from the selection process until the evaluation process. Also, the system provides a secure and fastest approach in managing the FYP processes.	The system is only a proposal to design an FYP system. No proposal related to dashboard or information visualization was mentioned in the paper.

Table 1 *(Continue)*

Article	Title	Current problems	Proposed FYP System	User	Main Function/ Features	Implementation of Any kind of Dashboard types
Leung et al. (2015)	The Development of a Final Year Project Management System for Information Technology Programs	It is kind of hard for students to communicate with their supervisor out of the consultation hours. All communication depends on the email. The students usually get a longer response time, which has caused the project to be progressed and be finished on time.	A system that can significantly improve the management and communication problem in the FYP program	Students and supervisors.	The developed system has five modules. The modules are: • Distribution of Project • Communication • Project Management • File Sharing and Repository • Submission & Grading Module.	The system has a one-stop information page for students to check on their FYP tasks and to-do lists. However, none of the features shows on the students' FYP progression.
Mohamed et al. (2017)	An Implementation of Final Year Project Management System: A Case Study at Universiti Sultan Zainal Abidin	The FYP is manually processed and managed using hardcopy forms and a booklet. The student's common problem was arranging appointments with supervisors and presenting their project assignments every week. Since there is no integrated system, the supervisor finds it challenging to track the project, particularly when the student misses the appointment.	This project aims to smoothen the communication process between the students and their supervisors, and the coordinator.	Students, supervisors, and head of department.	A web application was developed in which the application can be used to supervise and track the student's FYP progress.	The system has no implementation of any dashboard-style information. Also, the system does not show any information visualization related to students' FYP progress.

Table 1 *(Continue)*

Article	Title	Current problems	Proposed FYP System	User	Main Function/ Features	Implementation of Any kind of Dashboard types
Ismail et al. (2017)	Online Project Evaluation and Supervision System (oPENs) for Final Year Project Proposal Development Process	FYP is managed manually. There is no provided system or tools that can ease the administration of Student's FYP.	With the development of oPENs, students' data retrieval will be more straightforward and practical. It significantly can save much time.	Coordinator, supervisors, examiners, and students.	The oPENs system is provided with more secured features whereby in the system, it included safe storage for all the project's documentation as well as the student's marks. Also, it will be no errors in the final marks uploading process.	The system has no implementation of any dashboard-style information. The system does not show any information visualization related to students' FYP progress.
Khamaruddin et al. (2017)	Using Moodle as an Integrated Final Year Project Management System	The number of students and academic staff is increasing every year. The situation has caused some difficulties for the FYP coordinator to manage the FYP processes. The manual method does not help the coordinator to ease the management process. Thus, it is plausible to have a system that effectively enables the FYP's users to contribute to the whole process.	An online management system includes the students' final year project evaluation process by utilizing Moodle.	Students, supervisors, internal moderators, and examiners.	Moodle is used to organize the students' FYP submissions and their evaluations. The evaluation also could be conducted online. The system made it easier for the students to download and upload their files before the due date. Also, the functions available to the supervisors and examiners,	Using standard Moodle application in managing the FYP course. None of the functions showed any information visualization related to students' FYP progress.

Khamaruddin et al., 2017). In this view, the available progress monitoring processes may not be sufficient to assess how well the students have done for their project. Therefore, it might have a minimal effect on the student's performance towards completing their FYP works within the given time. The element of progression for project-based IT courses can give autonomy to the students in managing their project deliverables (Szynkiewicz et al., 2020). It will also make the project processes get more engagement from the students and academic supervisors (Buhari et al., 2017).

Regarding this, implementation of a Dashboards-based system could be an effective option to monitor the project progress and the student's system (Buhari et al., 2017). A dashboard provides a simple descriptive statistic of students' progress visualized for monitoring and decision process (Gutiérrez et al., 2020). Furthermore, following the previous implementation, as in Table 1, there is a limited Dashboard-based application in the FYP system. Research in dashboard analytics has generated considerable recent research interest (Buhari et al., 2017; Chik & Rafi'i, 2016). It shows that the student data analytics and the dashboard have an important role in advancing learning intervention in higher education (Aljohani et al., 2019; Buhari et al., 2017). In general, the dashboard and data analytics is a platform that presents a collection of data, reports, and analysis about learners and their learning contexts with the aims to comprehend and optimize the learning environment (Asli et al., 2019; Buhari et al., 2017; Leitner et al., 2017). It has many possible uses in a learning environment. It has also been investigated as a potential tool in students' learning patterns and behaviors and supports students' learning achievement (Abdulkareem et al., 2013; Aljohani et al., 2019).

Through dashboard and data analytics, it mainly summarizes the learners' learning achievement and progression. Thus, it helps to provide further insight into the students current learning progress status, list of any completed and incomplete tasks, their learning achievement so far, performance prediction, and related learning information in their educational context. The information presented in the dashboard indirectly allows the students to effectively manage their own time and space to conduct the courses (Abdulkareem et al., 2013). Thus, it will nurture the students to be more self-regulated towards their learning process. Furthermore, using a dashboard-based system in e-learning courses requires two-way content delivery. The courses allow the instructor to provide the content and the students' input to generate the analysis. Thus, they can be reported accordingly. Therefore, a dashboard can be a powerful tool supporting the learning environment involving students, instructors, system developers, and implementers to better implementation in learning and educational processes (Buhari et al., 2017).

Review articles have highlighted several types of research on dashboard applications in higher education (Buhari et al., 2017; Chik & Rafi'i, 2016). However, although the use of the dashboard in teaching and learning has increased, little attention has been paid to

research its practicality and applicability, mainly implementation in the FYP system. In these five years, research on dashboard and data analytics have been conducted primarily on 1) the application design and framework (Asli et al., 2019; Klašnja-Milićević & Ivanović, 2018), and 2) student's perceptions and acceptance (Sønderlund et al., 2019), 3) learning motivation and engagement (Kim et al., 2016), and 4) teaching and learning effectiveness (Abdulkareem et al., 2013). Meanwhile, for the effectiveness of the delivery of the FYP course, recent research had focused on the integrated web application that transformed manual workflow into more systemize processes (Ismail et al., 2017; Khamaruddin et al., 2017). Thus, apart from a web system, adapting a dashboard to simplify the process of managing and monitoring the progress of the final year project course could significantly affect teaching and learning activities in higher education. Therefore, a different type of FYP system that is not only about management system but a system that emphasizes graphical progression to indicate the completeness of the student's project is introduced. Furthermore, it is considered another approach that might gain more involvement from the students and the academic supervisors towards on-time project completion. Thus, the objectives of this study are 1) to design and develop the dashboard-based system for the students to manage and track their progress, as well as a tool to self-regulated, and 2) to assess the system accordingly.

In this paper, the groundwork of the system's development and implementation is presented. The development process and examine the system acceptance, and behavioral intention using a modified version of the TAM is described (Leung et al., 2015). This paper is organized as follows: Section 2 describes the material and methodology used in this study; Section 3 presents the system and dashboard developed for the FYP system; the result and findings are presented in Section 4; Finally, in section 5 offered discussion, concluding remarks, and future work.

MATERIALS AND METHODS

The Methods

This research adopts the Rapid Application Development (RAD) methodology to achieve this research's objectives. The methodology was chosen because it emphasizes rapid system development through prototype and reusable codes. Developers will work closely with the users in designing and developing the system. Quick responses during the user design cycle can expedite the design process. Reusable codes that are available in the open-source platform helps in speeding up the development process in the construction phase. Furthermore, the cutover phase helps finalize the system features and functions with suitable testing conducted within a short time. With that in mind, all the phases in RAD system development were followed. The phases include System Requirements Planning Phase, User Design Phase, Construction Phase, and Cut-Over Phase. The phases are shown

in Figure 1. RAD focuses on developing a prototype that provides rapid response during the cycles of development and testing. RAD processes were adopted mainly to accelerate the duration of application development, with high-quality results towards the system functions and features.

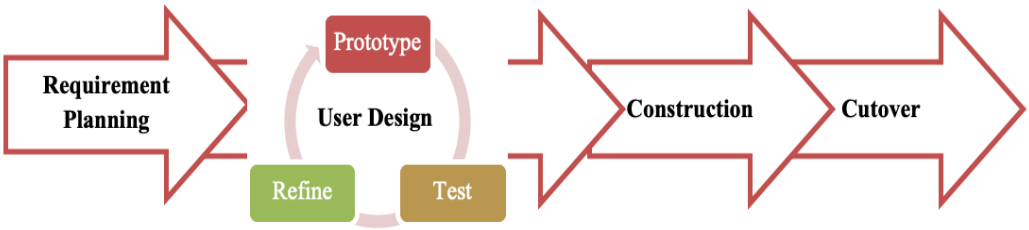


Figure 1. Rapid Application Development (RAD) methodology

Based on the model in Figure 1, details for each step performed are explained as follows.

1. System Requirement Planning: In the first phase, the researcher collected and analyzed system requirements and reconfirmed them with the users. In this case, the researchers collected FYP materials and data from the course instructor and conducted a focus group interview participated by the instructor, two lecturers, and two students' representatives.
2. User Design: This second phase involved an iterative system design process through prototyping, testing, and refining. In the first iterative process, a low fidelity prototype (storyboard/sketch, i.e., Figures 2a & 2b) was designed beforehand and sent to the focus group participants (same as in the previous phase) to get feedback. Then, based on the feedback, a high fidelity prototype (system design with minimum workable function, i.e., Figures 2c & 2d) is developed and tested with similar focus group participants. Following the second feedbacks, the hi-fidelity prototype was refined accordingly. Finally, in the third iteration process, another testing with the focus group participants was conducted again, and based on the testing, it resulted in a consensus among them. Thus, the confirmed system design was sent for construction.
3. Construction: At this stage, the refined prototype in the previous phase is improved into a fully developed system. Other than the functions and interfaces, the databases are the essential components to be accomplished. Hence, the integration of the system and its databases is made synchronously until the system development phase is completed.
4. Cut Over: This is the finalization phase. At this stage, the exclusive features, functions, and interfaces are finalized through system evaluation. For that purpose,

system testing with the expert users is conducted, and this testing is conducted to ensure all the functions work correctly. Following the system testing, user acceptance testing is conducted with the FYP's students. The testing is to examine the system acceptance and user behavior intention of using the system.

The next section will further explain the detail of the system requirement, design, application, and testing conducted in this study.

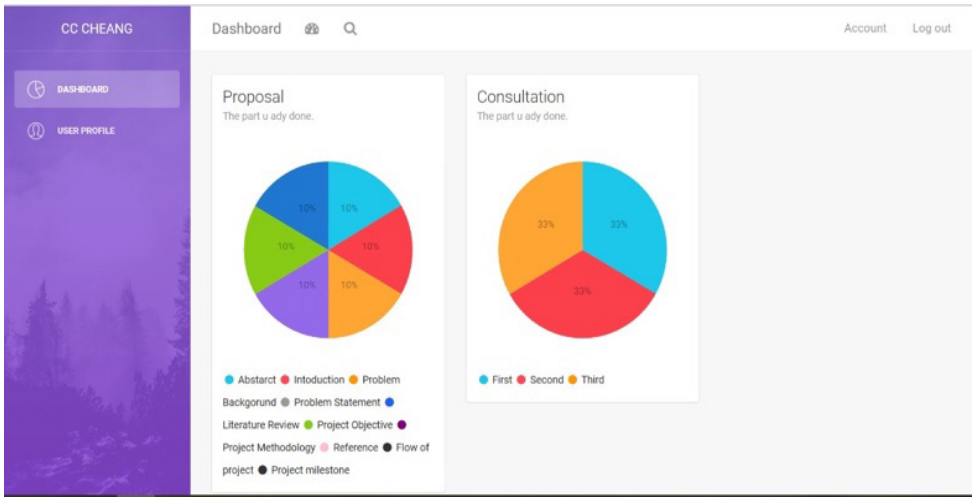
Figure 2. (a) low fidelity for system analysis & design setting; (b) low fidelity for implementation setting; (c) high fidelity for system analysis & design setting; (d) high fidelity for implementation setting.

The System Requirement, Design, and Application

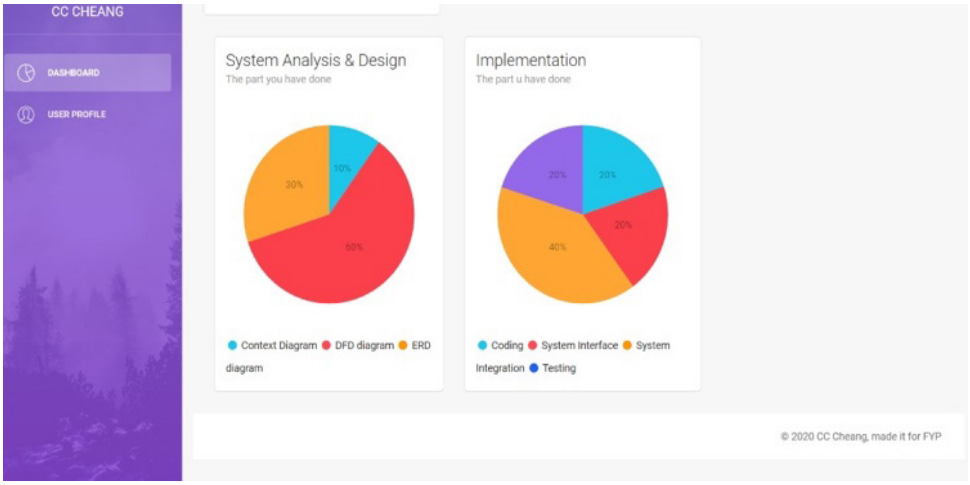
The developed FYP system in this study was purposely for computing and information technology students, whereby the features in the system are related to the nature of a system development itself. In this study, the FYP system was designed to be aligned with promoting the data analytics and dashboard into the course. There are a few important functions developed for that purpose. As the main objective of dashboard implementation in FYP was to enable the student to track their progress in completing the course, the dashboard will mainly show the information. The student progresses from 1) auto form completion, 2) student's file submission through the system, and 3) instructor remarks (coordinator or supervisor).

For the system to reach its potential, the FYP requirement and processes beforehand are summarized. This requirement is summaries based on the system requirement gathered in the first phase of the RAD system development. The FYP course is divided into two semesters, where in the first semester, the system will be designed and analyzed, and a prototype will be developed accordingly. In the second semester, the prototype system will be fully developed, tested, and deployed. However, the students were required to develop their project proposal a semester before the students registered for their FYP course. Therefore, the use of a dashboard will cover students' progress for all phases in both semesters. Figures 3(a) and 3(b) show the example of a student's dashboard for each phase in FYP. In addition, the details for each achievement are presented on another page, where information can be updated as required in the FYP processes. Following the progress of the FYP processes, once the faculty's committee approves the student's project, the students must submit their proposals through the system. The completion of the proposal can also be seen through the dashboard.

In FYP, consultation sessions are important to provide a platform for the students to allocate time for progress meetings with their supervisor and discuss ideas, issues, problems, and solutions related to their project. The supervisors can add the consultations, and the details for each consultation also will be recorded in the system. During the consultation, the students will present and submit the designs and analyses of their systems. In this sense (depending on the design method agreed by the supervisor and the student), the context diagram/use cases and the data flow diagram/sequence diagram. The respective supervisor will update the performance progress report for each student.



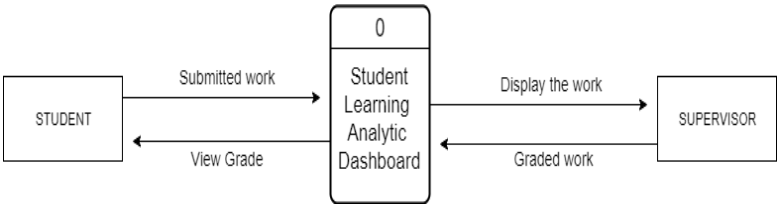
(a)



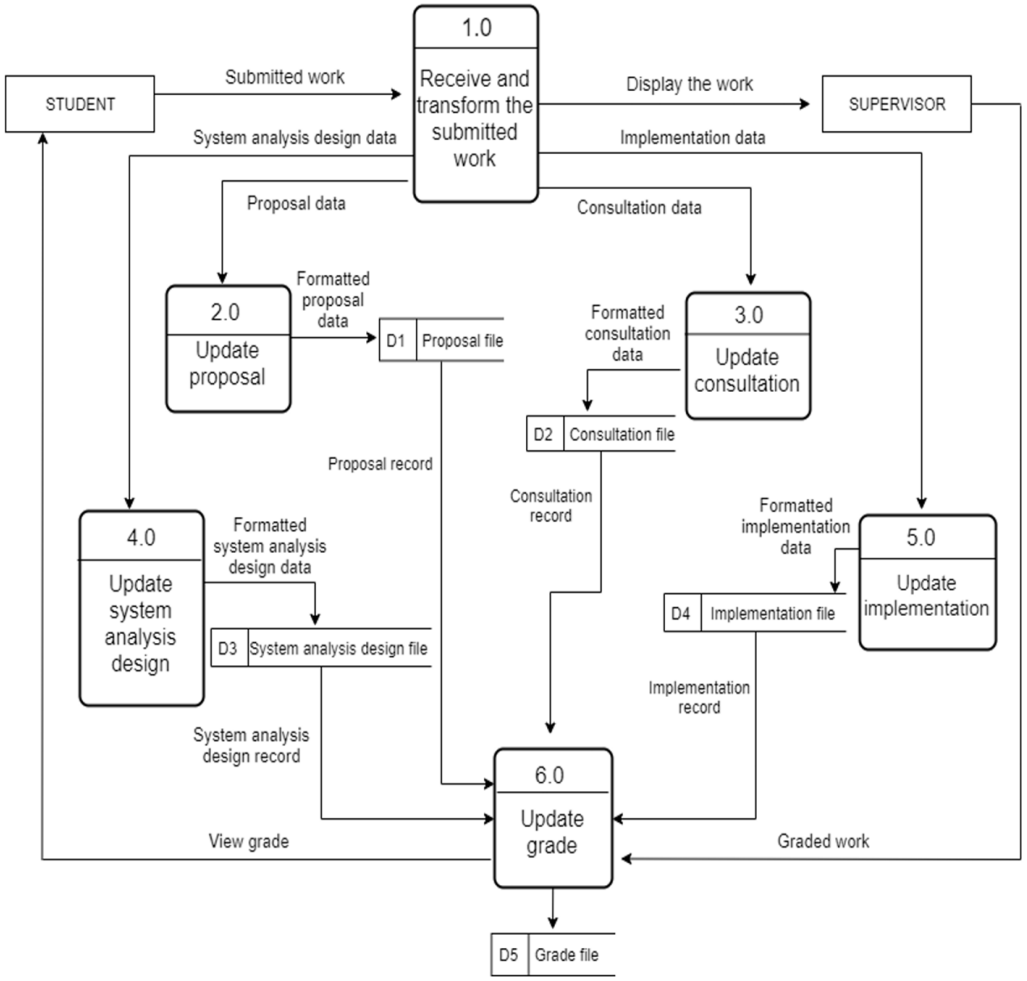
(b)

Figure 3. (a) Dashboard interfaces for proposal and consultation; (b) Dashboard interfaces for system analysis and design and implementation

The progress of students' performance is similar to the progress of implementation. The students are required to submit their material to the supervisors, and their progress will be recorded in the system. This performance progress monitoring-based function using a dashboard is transparent to the student and supervisor. The students can practically identify the gap in their progress, work on it, and accomplish them. The supervisor and instructor could also monitor how far the student has achieved at a particular time. With the implementation of a dashboard in the FYP course, it is expected that at the end of the course, the students are able to plan, design, develop and test an IT-related project very well structured. With all the required processes in mind, the system is designed accordingly. The design of the system processes is illustrated as in the context diagram in Figure 4a and Data Flow Diagram in Figure 4b.



(a)



(b)

Figure 4. (a) System context diagram; (b) System data flow diagram

Development and Testing Material

The system was developed utilizing the Laravel framework, Apache server, MySQL databases and coded using PHP languages. All development tools are open source-based, easy to use, and maintainable. For the evaluation purposes, the TAM, as previously studied in (Ifenthaler & Schumacher, 2016; Revythi & Tselios, 2019; To & Tang, 2019), has been used to verify the students' behavioral intention to use the FYP system is affected by the student's perception of using the system. The constructs adopted from the TAM model consist of perceived usefulness, perceived ease of use, and behavioral intention. Each of the constructs is defined and its related items for this study. The model, as in Figure 5, and details of each construct are explained in Table 2. The questionnaire item is rated using the Likert Scale from 1 (Strongly disagree) to 5 (Strongly Agree).

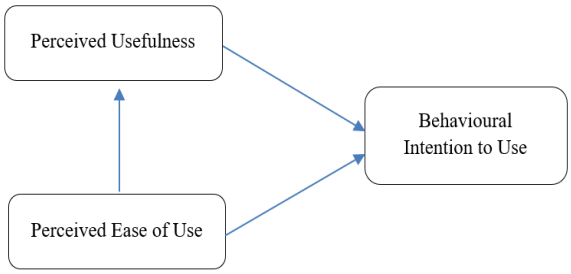


Figure 5. Adapted Technology Acceptance Model (TAM)

Table 2

Construct definition of Technology Acceptance Model

Construct	Operational Definition	Items
Perceived usefulness	The construct reflects the students' perception of whether the use of dashboard and data analytics (DDA) in the FYP system will enhance their FYP performance.	Using dashboard and data analytics in the FYP system would enable me to see my progress more quickly.
		Using dashboard and data analytics in the FYP system would improve my academic performance.
		Using dashboard and data analytics in the FYP system will enhance the effectiveness of learning.
		I find the use of dashboards and data analytics in the FYP system useful.
Perceived ease of use	The construct refers to the student's responses towards the ease of understanding the use of dashboard and data analytics in the FYP system.	I find dashboard and data analytics in the FYP system easy to use.
		Learning to use the dashboard and data analytics in the FYP system is easy for me.
		It is easy to become skillful in using the dashboard and data analytics in the FYP system.
		I would find dashboard and data analytics in the FYP system to be flexible to interact with.

Table 2 *(Continue)*

Construct	Operational Definition	ITEMS
Behavioral intention to use	The construct refers to the student's intention to use the FYP system, dashboard, and data analytics in monitoring their progress.	I intend to continue using the system for my FYP course. I will always try to use the system for my FYP course. I plan to continue using the FYP system throughout the semester.

RESULT AND DISCUSSION

System Testing

System testing was conducted to ensure the system functionalities were working accordingly and following the user's requirements. For the testing, the test plan was developed for every function. Following the plan, testing was conducted on five expert users. These experts were the individuals who work closely with the FYP processes and those who are proficient in system development and user interface design. Table 3 shows the detailed demographic of the experts. The distribution of the expert users is considered reasonable based on their years of experience in the subject matter, the field of expertise, and their employment status.

Table 3

Expert demographic

Demographic	**No**
Gender	
Female	3
Male	2
Age	
30 - 40	2
41 - 50	2
51 - 60	1
Employment Status	
Senior Lecturer	3
IT Officer	2

Demographic	**No**
Field of Expertise	
User Interface	1
System Development	2
FYP processes + User Interfaces	2
Years of experience in the field	
3 - 5	2
6 - 9	2
10 and Above	1

During the testing, the expert users were explained every feature in the system and how the features for each user of the system are linked together. The experts were given one day to test the system personally, and they were asked to report back to the researcher of their findings with comments for improvement. As a result of the testing, no errors have been found, and all functions work correctly. However, the expert users have made a few suggestions to ensure the information is presented clearly and the system is easy to use and more user-friendly. The suggestions are summarized in Table 4.

Table 4
Suggestions from evaluators

	Suggestions for Improvement
System Functions	• The input text should be re-designed (for bigger text size) and scrollable
	• Visibility of the user profile at the left panel with options to update directly
	• To change the upload button for multiple file uploaded function.
User Interface	• The use of color for the chart
	• The legends ordered
	• Update button should be more obvious
	• To add student avatar (changeable depends on student's achievement)
Others	• Registration can be arranged into a more straightforward mode as some of the student's information can be found in the university's Student Information System (SMP).

Acceptance Testing

A questionnaire survey to 25 users was conducted to ensure the system was accepted and practically used. They were students who had passed the course (20%), are currently taking the course (40%), and will be registering for the course in the following semester (40%). For the latter category of the student, these students are in the pre-process of taking the FYP course in their current semester. During this pre-process, they were asked to develop a proposal, and they had several consultation sessions with the course coordinator. Thus, they would also be able to reflect the processes of the system. In the acceptance testing, the users were asked to use the system following the given instructions (Register, update/

upload proposal, and add/update consultation). Once completed, a postal questionnaire survey using TAM, as detailed in Table 2, is conducted.

As a result, the mean score and *SD* for perceived usefulness, perceived ease of use, and behavioral intention to use are shown in Table 5. The result indicates that the student's responses are primarily towards "strongly agree" in using dashboard and data analytics in the FYP system. Reliability analysis was conducted to ensure the consistency of the items used in the questionnaire. Generally, the construct should achieve .70 and above to indicate that the items are measuring the same constant. The result in Table 6 shows that overall Cronbach's Alpha is .68, whereby each of the constructs obtained more than .70. Correlation between the construct was also tested to verify the student's intention in using the FYP system. This intention is affected by the student's perceived usefulness and perceived ease of use of the system. For that, Table 7 reports the correlation coefficients between the constructs.

Table 5

Mean and standard deviation responses

	N	Min	Max	Mean	SD
Perceived usefulness	25	3.00	5.00	4.26	0.68
Perceived ease of use	25	3.00	5.00	4.42	0.61
Behavioral intention to use	25	3.00	5.00	4.35	0.63

Table 6

Construct reliability

Construct	Cronbach's Alpha	No. of Item
Perceived of Usefulness	.75	4
Perceived Ease of Use	.70	5
Behavioral Intention to Use	.73	3

Table 7

Correlation between the constructs

Construct	Perceived of Usefulness	Perceived Ease of Use	Behavioral Intention to Use
Perceived of Usefulness	1	.328**	.406**
Perceived Ease of Use	.328**	1	.969*
Behavioral Intention to Use	.406**	.969*	1

**: Correlation is significant at the 0.01 level (2-tailed)

Perceived of usefulness is significantly correlated to perceived ease of use ($r = 0.328$ at $p = 0.005$) and the intention to use the system ($r = 0.406$ at $p = 0.005$). Also, the perceived ease of use is significantly correlated to the intention of using the system. Thus, the use of a dashboard in the FYP system was perceived as useful and easy to be used, and because of that, the students intend to use the system for their FYP course. This result added to the contribution of dashboard application in teaching and learning activities, whereby it further supports the previous works on the effectiveness of dashboard and data analytics in learning and teaching and on course delivery by Ismail et al. (2017), Klašnja-Milićević and Ivanović (2018), and Leitner et al. (2017). Besides, using a dashboard is a good strategy for learning analytics implementation in teaching and learning (Gutiérrez et al., 2020; Tsai et al., 2020). This work also supports the requirement and needs of dashboard and data analytics implementation for other types of university courses like the student's e-community project (Ahmad et al., 2019).

CONCLUSION

The use of student data analytics dashboards can help monitor and improve the student's performance and benefit the structure and management of the course itself—the FYP system aims to stimulate students' psychological changes by improving self-regulated and social awareness. Moreover, by providing a dashboard-based system, the instructors can monitor and evaluate the progress of the students' performance and get the best result from it. Hence, using an analytic data dashboard could help achieve the FYP system's aims in general. From our study, the implementation of a dashboard for the FYP course indicates that students intended to use the system for their FYP because it is perceived as beneficial for their academic progress and effective for the course. For future work, the system will be expanded with more features that enable the students to showcase their system and allow the instructor to manage the evaluation process through the system. In conclusion, the data analytics dashboard significantly affects course delivery where course materials were collected and analyzed accordingly. Thus, this research has contributed to learning efficiency as well as to learning management research.

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