

A SYSTEM FOR MONITORING AND REPORTING OUTCOMES PERFORMANCES OF STUDENTS USING TABLEAU DASHBOARD AND PA-ANAS TOOL FOR PERSONAL/STUDENT ADVISOR

Mohaiyedin Idris¹, Aida Zulia Zulhanip², Adi Izhar Che Ani³, Nor Fadzilah Mokhtar⁴ and Yusnita Mohd Ali⁵

^{1,2,3,4,5}Faculty of Electrical Engineering, Universiti Teknologi MARA (Pulau Pinang), Jalan Permatang Pauh, 13500 Permatang Pauh, Pulau Pinang, Malaysia.

¹mohaiyedin5055@ppinang.uitm.edu.my; ²aidazulia835@ppinang.uitm.edu.my;

³adiizhar @ppinang.uitm.edu.my; ⁴norfadzilah105@ppinang.uitm.edu.my;

⁵yusnita082@ppinang.uitm.edu.my

ABSTRACT

Most lecturers in the faculty of Universiti Teknologi MARA (UiTM) are assigned as personal/student advisor (PA). The role of PA in the faculty is to assist students in the scope of personal, social, practical, financial and academic while studying at UiTM. The implementation of Outcome Based Education-Student Centered Learning (OBE-SCL) is imposed by the academic affair in sustaining graduate's qualities. Therefore all assessment activities must be aligned and measured with respect to course outcomes (COs) and program outcomes (POs). In this paper, the capabilities of a continuous student monitoring instrument based on OBE-SCL criteria aligning with PA channel is presented. The instrument is known as PA-ANAS (Personal/Student Advisor-Analysis System) system which is developed by the OBE unit at the Faculty of Electrical Engineering UiTM Pulau Pinang. The system utilizes graphical user interface mechanisms (GUI) together with a database to obtain details of student's POs achievement under the supervision of a PA. Using this system, a PA can always monitor, provide recommendations and ensure that each student will be able to achieve performance index of POs. In order to improve the reporting of a student's POs performances, the concept of storytelling utilizing a Tableau dashboard software which features an interactive and attractive visualization is adopted. The dashboard provides compact information with one click button and meaningful analyses for better and fast decision making in order to enhance POs performances.

Keywords: personal/student advisor; program outcomes; data visualization; data reporting; storytelling; tableau dashboard.

1. INTRODUCTION

Outcome Based Education - Student Centered Learning (OBE-SCL) has become an important approach to adopt the needs of challenging in teaching and learning. The OBE- SCL is one of

the paradigm shifts from the traditional way teacher-centered to the student-centered learning and strongly supports by the involvement of Engineering Accreditation Council (EAC) (Engineering Accreditation Council, 2012). OBE-SCL consists of mapping of the course outcomes (COs) of the subject with the faculty program outcomes (POs) (Amirulddin, Osman & Hamid, 2009).

Indirectly, these outcomes need to comply by program education objectives (PEOs) which are listed by the faculty and as guidelines to support the mission and vision of the university. The implementation of OBE-SCL is focusing on sustaining student's qualities. The assessment activities where contributed from student achievement from the courses with respect to course outcomes and program outcomes are required to monitor.

Similarly in UiTM Pulau Pinang the personal/student advisor (PA) has been made compulsory as to help students during their academic endeavor. According to Omar (2010), PA can be a role model for their students to excel in their studies, guiding them in study skills, time management and critical thinking as they get lesser guidance from the family on such issues. Each of the students will be assigned with one PA throughout his or her study in the program. Therefore, this paper performs the systematic method to monitor student's POs achievement so as to enable the PA to continuously monitor and give more on attention those students who have contributed lowest POs performance achievement. The monitoring mechanism of the Tableau Dashboard integrated with PA-ANAS tools will improve data reporting/monitoring and provide immediate feedback towards student's PO performances. For now, the system has been tested and implemented in the Faculty of Electrical Engineering UiTM Pulau Pinang.

2. PROGRAM OUTCOMES, POS ELEMENTS IN AN ENGINEERING PROGRAMME

POs describe the expected performance or attainment by the time of graduation which required to be achieved by the student at the time of graduation. POs key elements encompass with three fundamental domains in the region of cognitive, psychomotor and affective (Rashid, 2012). Lee, Riche, Isenberg & Carpendale (2015) state in most traditional method, students' POs achievement and development in an engineering program especially is often left unexamined when much of the attention is placed on benchmarking students' performance against absolute standards such as Grade Point Average (GPA).

In response to the latest demand of the paradigm shift to an OBE-SCL approach to teaching and learning, there is much attention in using graduate attributes and POs for benchmarking as highlighted by EAC (Engineering Accreditation Council, 2012). Students' learning experience and development across the curriculum in conjunction with their performance upon graduation are both useful but complimentary sources of evidence for examining the effectiveness of an engineering program. The EAC has made it compulsory for EAC accreditation that Institute of Higher Learning (IHL) must ensure of the existence a quality management system to oversee and monitor the overall achievement of POs (Engineering Accreditation Council, 2012).

In UiTM Pulau Pinang, the POs attainment is contributed from each course in the program. Each assessment of the course such as test, quizzes or assignment and final exam will contribute to certain POs marks based on the students' percentage score. By having the

assessment contributed to POs marks, the evaluation of POs achievement can be measured as required by the EAC.

3. THE TABLEAU DASHBOARD

Data visualization is usually focuses on data exploration and analysis. Since this system handles a huge amount of data, we need to make sure the system users are not burdened in the purpose of monitoring and analysis. The data presented need to be very effective yet lasting. To get the users engaged with the system, it is important to provide interesting data visualization (Kosara, 2016).

According to Robert Kosara and Jock Mackinlay, the tableau dashboard was practiced in many disciplines hence offering the huge opportunity to other fields. The educational dashboard is the first used in Malaysia (Kosara & Mackinlay, 2013). There is a wide opportunity in marketing the product as education is a major business sector in Malaysia. The tableau dashboard is a type of animated presentation which provides entertaining and captivating visualization (Kosara & Mackinlay, 2013). In addition, it is simple yet presentable in a way that any user can easily understand the whole information. The POs achievement score by each student is collected and collated in accordance with the PA and updated using Tableau dashboard software as depth in data reporting and analyzing. Even though, the development of PA-ANAS can be used as monitoring purposes, to improve immediate feedback towards student's POs performances, the concept of storytelling provides interactive features incorporated with the animated presentation which is equipped with interesting visualization (Kosara, 2016, Kosara & Mackinlay, 2013, Lee, Riche, Isenberg, & Carpendale, 2015 and Figueiras, 2014). Using this dashboard, it is easy to assist the PA to predict consistently.

4. RESEARCH METHODOLOGY

4.1 *The System Design*

The PA-ANAS system design is divided into two primary stages. One is the user interface design for PA and second is data storage design. The graphical user interface (GUI) is developed by using Microsoft Visual C# to facilitate user to access data from server, while the data handling server is designed with used Microsoft SQL Server 2012. The server is named as ANAS server. The overall system design is shown in Figure 1. After student completed the course at the end of current semester, the course coordinator is required to fill the course analysis template. The template consists of individual/student score which encompasses of assessment such as tests, assignment/quizzes or final exam that are related to the POs and COs score. Hence, the course coordinator required to upload the detail of course template into the ANAS server using PA-ANAS tools. After all the offered courses in the semester have been successfully uploaded at a given time-based the advisor is able to obtain/monitor the individual POs achievement and further analysis can be easily carried out using Tableau dashboard tools. Figure 2 shows the advisor activity processes with representations of data preparation, data upload and the PA activities.

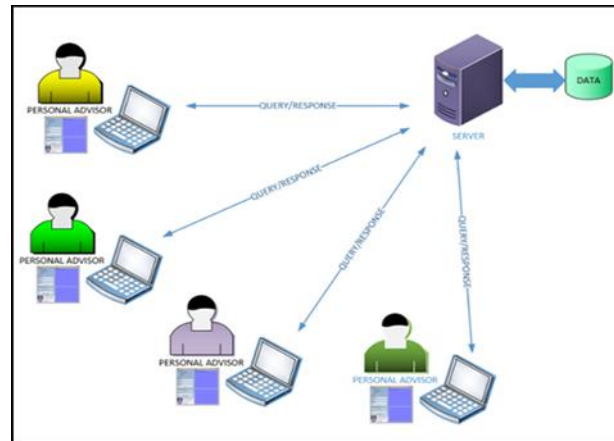


Figure 1: Client-Server interaction (Idris, Zulhanip, Shafie, & Chone, 2013).

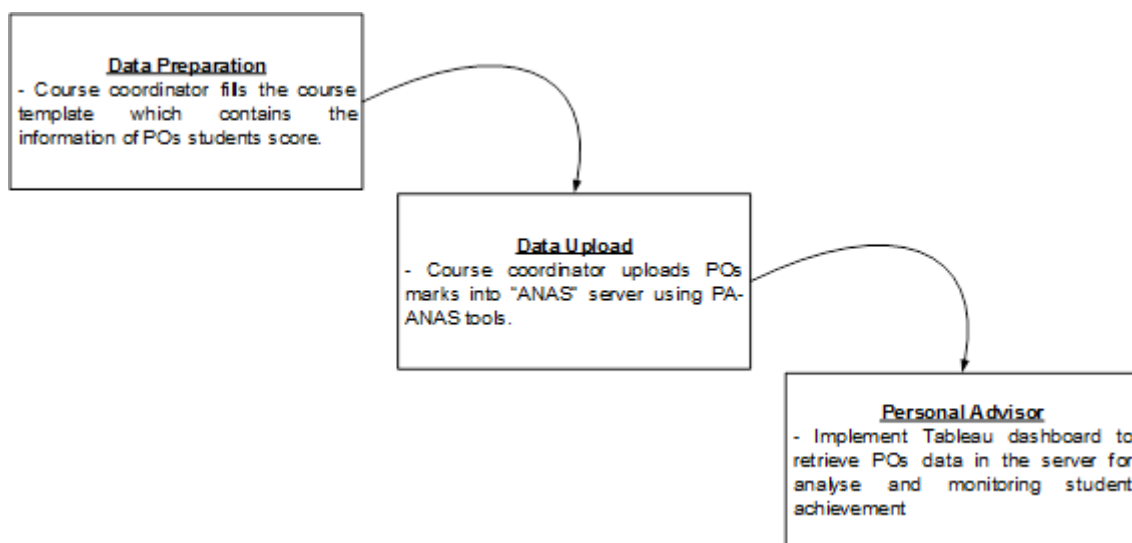


Figure 2: System design procedure.

4.2 The PA-ANAS System Process

The PA-ANAS system is developed with consisting of three main parts. The first part is the PA user login. In this part, the system only allowed an authorized PA to access the system by verifying user insertion detail with user detail in the “ANAS” server. As for the second part after the login verification, PA needs to select several parameter setting. The parameter setting consists of student intake identification, program selection and KPI level selection. The KPI level is set by faculty indicating three (3) level which are; (i) Level 1: less than 50% score, (ii) Level 2: between 50% and 65% and, (iii) Level 3: greater than 65%. The faculty decided to choose “Level 3” for monitoring purpose. After completing the parameter setting, PA can later monitor the result of student’s POs score in the third part of the system which is shows in Figure 3.

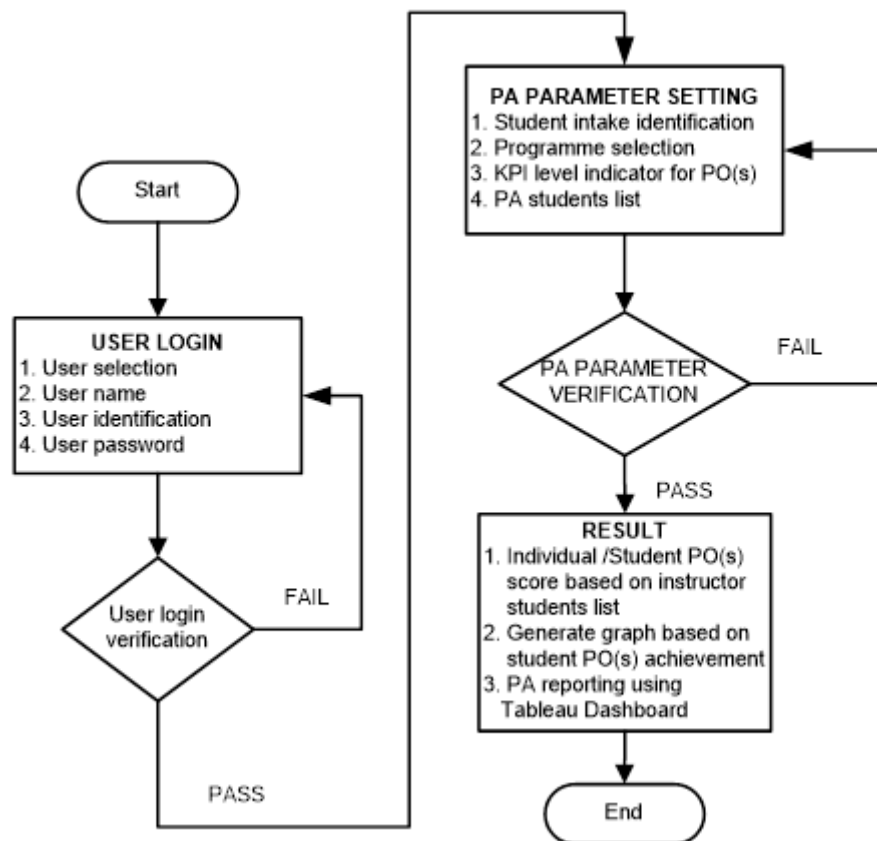


Figure 3: PA-ANAS system flowchart.

Figure 4 shows the main page of the system whereby the PA is required to provide the correct login details as required by the system. There are three options for user to select which includes i) PA, ii) coordinator program and iii) administrator. The academic advisor must select PA on the user selection upon login. The coordinator program on the other hand must select the coordinator program option to login and hence setting the program Key Performance Index (KPI) for POs under the program. The administrator is refers to the OBE unit in the Faculty of Electrical Engineering, UiTM Pulau Pinang to maintain the system.

After the access is granted, PA can view the student's POs scores in the PA Monitoring screen as shown in Figure 5. In this section the parameter setting such as semester identification selection which is related to semester intake and program is to be chosen by the PA. The system will automatically show the POs scores for each student who does or does not achieve the minimum requirement of POs KPI level as indicated by the green and red color cells respectively. While the yellow color cell shows that the student does not fulfill the POs in his/her current semester. Furthermore, PA can generate the achievement of POs score for each student in a graph format in order to provide better monitoring of the increasing and decreasing students Pos.

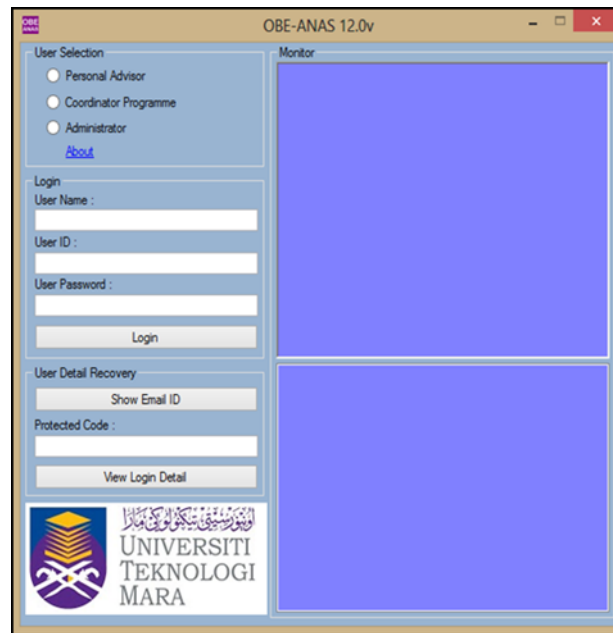


Figure 4: Main page of PA-ANAS system.

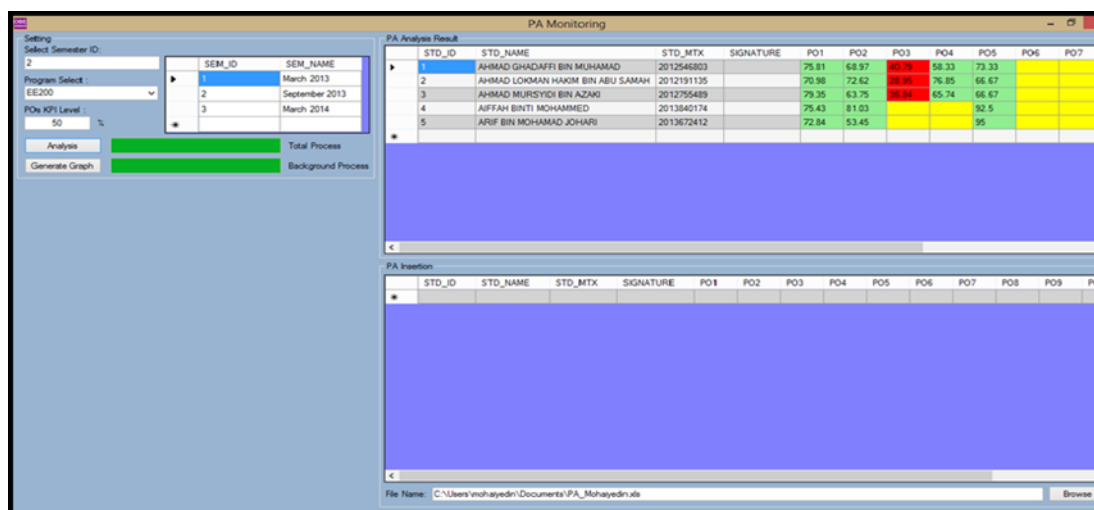


Figure 5: PA monitoring result using PA-ANAS tools.

5. POS DATA REPORTING WITH TABLEAU DASHBOARD SOFTWARE

The achievement of POs score by each student is collected accordance to PA. Thus, this score is updated by using Tableau dashboard software as depth data analysing and reporting with interactive animated presentation. Using this dashboard also, it is easily to assist PAs to consistently predict the students POs performances of the courses and to track or retrieve the previously recorded data of the students throughout the entire semesters. Figure 6 shows the PA monitoring dashboard using the Tableau dashboard software.

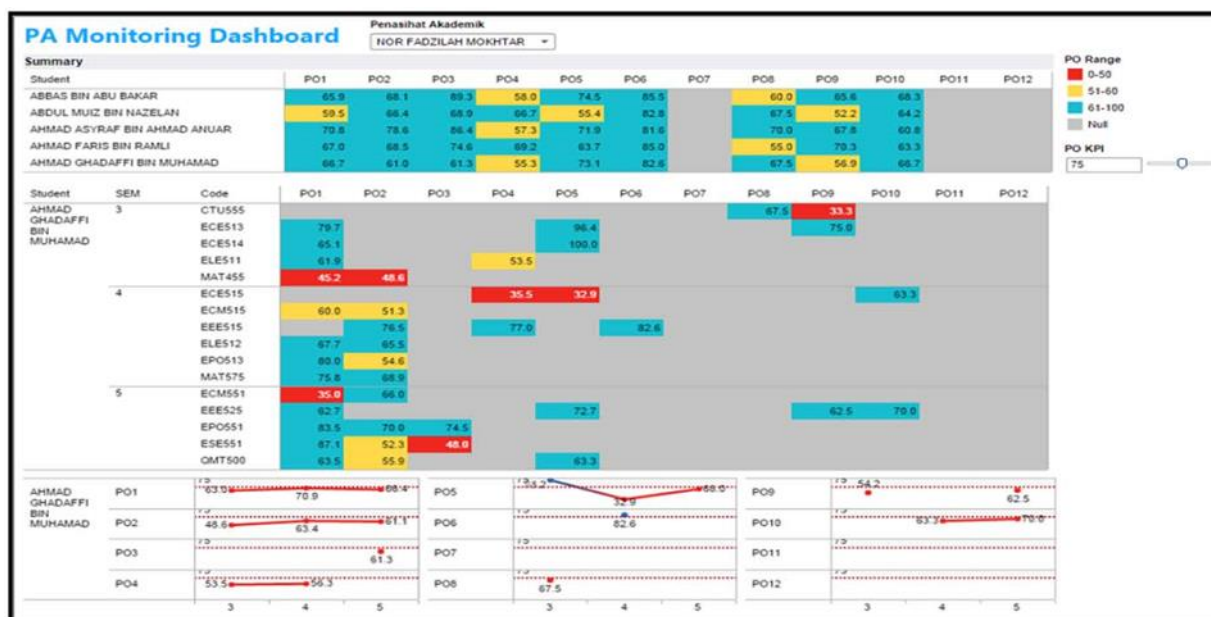


Figure 6: PA Dashboard using Tableau dashboard reporting system.

The dashboard has been designed in such a way for PA to view and monitor their entire student’s performance in a single page. Each PA can use the list drop menu to select their PA page that contains the details information of their students. Figure 7 shows the summary of overall performance of each student under their supervision.

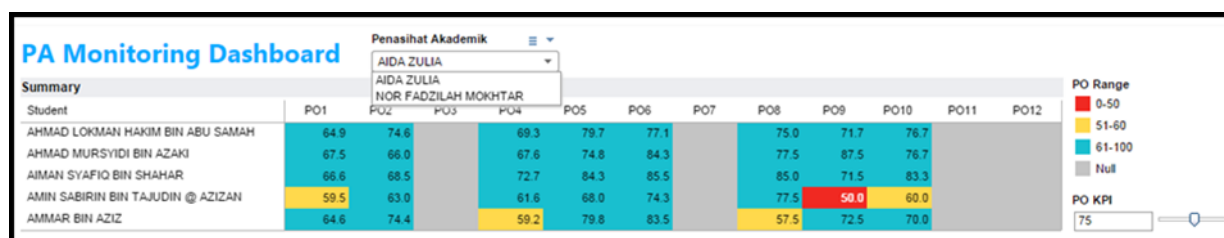


Figure 7: Student achievement summary.

The student’s performance data is displayed in a different color based on their POs range achievement. The data highlighted in red color indicates the poor performance in range 0 to 50. This suggests that such performance needs to be monitored. The yellow data indicates the average performance in range 51 to 60. This indicates that the PA has to ensure a student’s awareness. Moreover, the blue data highlighted as good POs performance and should be maintained or improved by the students to complete their studies.

By using this feature, PA will alert their students who need full attention to make sure they will perform well in their coming semester. By clicking the highlighted data, in the table of summary, the list of the subject that is mapped onto the related POs number will appear at the right side of the dashboard as shown in Figure 8. This information will help PA to give an input and assist their student on which subject should be improved to enhance the poor POs. For example, in order to improve PO9, the student is advised to focus more on EEE525 subject in semester 5.

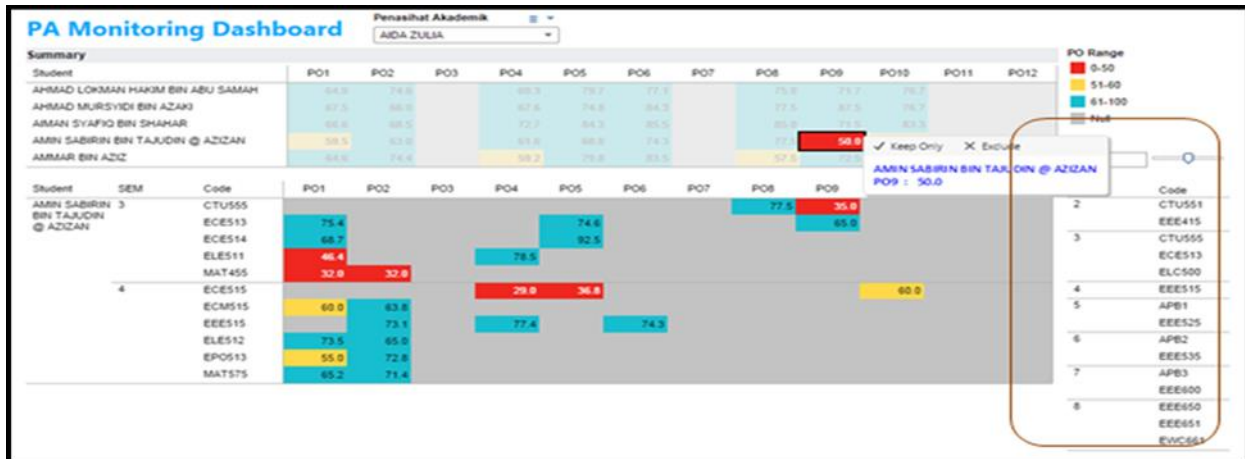


Figure 8: List of POs mapping with course code.

The dashboard also contains information of POs achievement history on each subject or code taken in the previous semester. The information is displayed as shown in Figure 9. The table shows the detail information and POs achievement of each subject or code performed by the student. Other information available in the dashboard is the POs trend as shown in Figure 10 which gives information of POs achievement from the first semester until current semester in the form of graphical visualization. It will help PA to see the trend of each POs of their student whether it reaches or is below the targeted KPI in each semester.

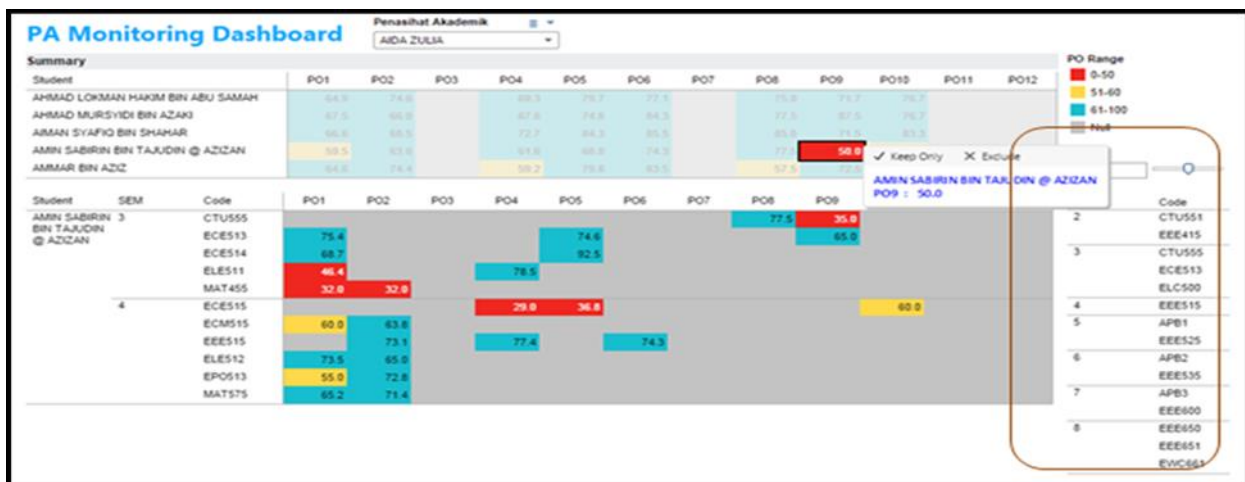


Figure 9: POs achievement data history.

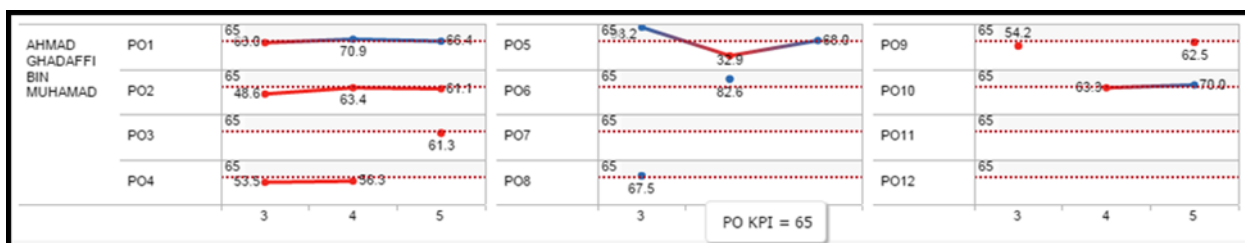


Figure 10: POs trend.

6. CONCLUSION

According to the ABET (2015), the programme outcomes define students are expected to know and be able to do by the time of graduation. The measurement of POs are mainly attributed to students' academic achievement in terms of OBE-SCL. As a result, the PA-ANAS system has been developed to monitor student POs performance to always be in the right track. The Tableau dashboard is also used as addition for POs data reporting. This third party software provides time consuming issues in analyzing data and meaningful analyses for fast decision making to enhance POs performances in Electrical Engineering. The Tableau dashboard also displays all information for PA to monitor student achievements every semester after compiling data from PA-ANAS system. With these integrated system (PA-ANAS and Tableau dashboard tools) the PAs are able to monitor students under their supervision to fulfill the KPI level which has been set by the faculty. By doing this, the faculty is able to sustain the program outcomes with respect to students being more skillful, knowledgeable and ethical engineers in the future. In this first phase of upcoming work, in order to improve the monitoring capabilities of the system; the future research is suggested to monitor which course provides lowest, highest and average score of POs. This is done so that the academic advisor can offer the highest priority of monitoring on the related course.

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