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MONITORING STUDENT ATTENDANCE USING DASHBOARD

Hasniza Yahya

UniversitiTenagaNasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia

Rina Md. Anwar

UniversitiTenagaNasional, Jalan IKRAM-UNITEN, Kajang, Selangor, Malaysia

ABSTRACT

Research has shown that student attendance has positive relationship with academic achievement. However, the manual process of taking attendance using paper does not allow the teacher to easily view and monitor individual attendance. The purpose of this paper is to discuss the use of dashboard in managing and monitoring student attendance. By using the attendance dashboard, teacher can easily track the attendance of a student and take necessary actions when needed.

Keywords: Selfdash board, Attendance, Monitor.

1. INTRODUCTION

Regular attendance is important to student learning. According to (Allensworth& Easton, 2007) there is a positive relationship between the number of days a student was present at school and the learning outcomes. In another study, (Gottfried, 2010) also found that a student who attends the class regularly in the college year also performs much better than those who regularly absent. Based on similar studies, Romer proposed that policies aimed at increasing attendance in college or made the attendance mandatory might be considered in order to improve students' performances (Gottfried, 2010).

In UNITEN, it is also a policy for students to attend at least 80% of the class attendance throughout the semester in order to be able to take the final exam. This is consistent with many studies that associate the number of class attended with the performance of the students. Therefore, it is crucial for each lecturer to monitor his/her students' attendances in order to detect the absenteeism as early as possible. Normally, when a student did not come to class for 3 consecutive classes, lecturer will send a warning letter informing the students about the consequences. This will prevent students from continuously become absent. However, since the process is done manually, and the number of students in one class can be up to 100 students, it is very difficult for a lecturer to monitor the students' number of absences. It is also difficult because the number of face to face class depends on the number of credit hour. For example, in Database course with 4 credits, the

lecture hour per week is divided into 2 hour and 1 hour lecture on different days. A part from that, there is also another 2 hour lab session to be attended by students. Therefore, when a lecturer needs to monitor student' absences, he/she has to go through the attendance papers and count the number of absences manually from each class. This requires a lot of time. It is also possible for the lecturer to miss some students who has been absent for a number of time.

In order to solve this problem, we propose the use of dashboard in monitoring student's attendance and absent rates. We believe that by using dashboards, lecturers will be able to see the trending of data over a period of time. Lecturers will be able to detect any irregularities easily by looking at the dashboard alert. Lecturers may also drill down any summary for detail information. All the features will help lecturers to take necessary actions in order to warn a student.

2. DASHBOARD IMPLEMENTATION

According to (Few, 2006), dashboard refers to a visual display of the most important information that is needed in order to achieve one or more objectives. The information is consolidated and arranged on a single screen so the information can be monitored at a glance. According to (Harel& Sitko, 2003), University of California, San Diego's report define dashboard as a tool that is "intuitive, easy to access and use, and flexible enough to accommodate data in different formats and protocols. Above all, they must bring the data to life for managers looking to gain a better understanding of their campus or university-wide financial operations". Nevertheless, we define dashboard as an interactive visual tool that represents real time data in graphics format and in one screen. Dashboard allows users to get the information quickly and easily from one screen (Elias &Bezerianos, 2012). It also allows users to choose data according to the users' needs.

2.1. Types of Dashboards

Dashboards have been used by companies and enterprises worldwide. Each dashboard is developed with different purposes. However, the main goal of having dashboards is to help making decision quickly. This is because, the required information is normally displayed in one interface and the visual representation of data makes the information readable. Currently, there are several categories of dashboards such as Enterprise Performance dashboards, Divisional dashboards, Process/Activity Monitoring dashboard, Application dashboards, Customers dashboards, and the Vendor dashboards (Suryatiningsih, 2011). However, (Wayne, 2006) and (Few, 2006) have categorized dashboards according to management level such as operational dashboard, analysis/tactical dashboards and strategic dashboards. Strategic dashboard is used to support at the strategic level management, tactical dashboard is used to support at the tactical level management and operational dashboard is used to support the operational level management. Based on this definition, the proposed attendance dashboard is categorized under operational level management which may provide real time information in order to give awareness to the things that need to be responded to quickly. In her research, Suryatiningsih also states that operational dashboard focus on monitoring activities and events that change constantly using a simple presentation media and

normally an alert is presented in a way that is easy to understand, and able to attract the attention of the user (2011).

2.1. Elements of a Good Dashboard

A dashboard is a tool that displays performance indicators and other relevant information to a user. As such, it should be interactive and allow the user to drill into particular aspects of the display as well as to switch between views of data. According to Dundas Data visualization, a dashboard should have elements such as ability to highlight important data, use of effective color, and have visually appealing interface (2013). It should have data visualization tools like charts, grids, gauge and maps. It states that "a dashboard can save employees time - and companies money - by making everything more intuitive, easier to observe, and allowing for extensive, real-time access instead of going through papers and emails to compile information". Dundas Data Visualization also suggests several elements of a good dashboard that a developer should follow which has been stated below (2013):

- A good dashboard communicates with clarity; quickly, and compellingly. It should be simple.
- A good dashboard has minimal unnecessary distractions, no matter how interesting, because it could cause confusion.
- A good dashboard organizes business information to support meaning and usability.
- A good dashboard applies the latest understanding of human visual perception to the visual presentation of information.
- A good dashboard is pleasant to look at.
- In addition, a good dashboard should also have the ability to drill down information so that users can see the details behind the summary information.

2.1. Dashboards for University

University can use dashboards to manage its day to day operations. By setting appropriate metrics, dashboard will be useful for staff, students, and college as well as research centers to visualize information graphically. There are many types of dashboard for university to use. (Muntean, 2010) classified six types of dashboard for university management as shown in figure 1 below.

Figure-1. Performance Dashboards for University (Muntean, 2010)

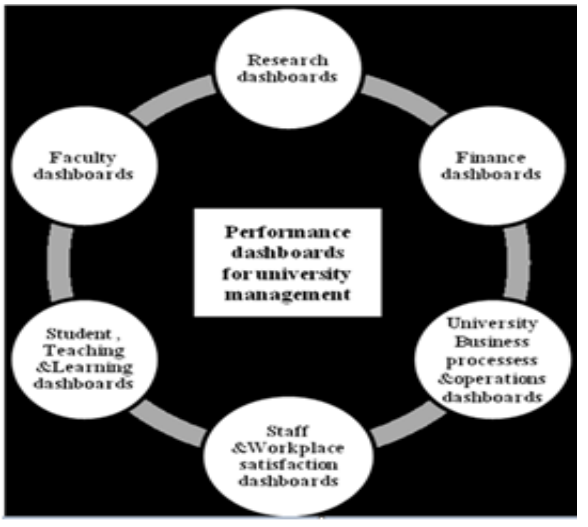


Figure 1 above shows an integration of several dashboards in developing Performance Dashboard for University Management. The dashboards are Research dashboards, Faculty dashboards, Student, Teaching and Learning dashboards, Staff and Workplace Satisfaction dashboards, University Business Processes and Operations dashboards and Finance dashboards. As discussed by (Muntean, 2010), it is very important to identify and monitor key performance metrics for the university administration in order to determine how well a particular university or department has achieved its goals. The performance indicator should relate to the university objectives and strategies in order to identify whether the goals has been achieved. The dashboards should also allow the managers to detect any negative indicators easily so that necessary actions would be taken.

Muntean suggested that university uses dashboards to manage student performance by setting performance metrics and manage the indicators over time (2010). Some of the metrics are the graduation rates, number of degree awarded, number of undergraduate enrolment, number of female and male students and many others. These metrics will act as indicators to the university management in achieving the set goals.

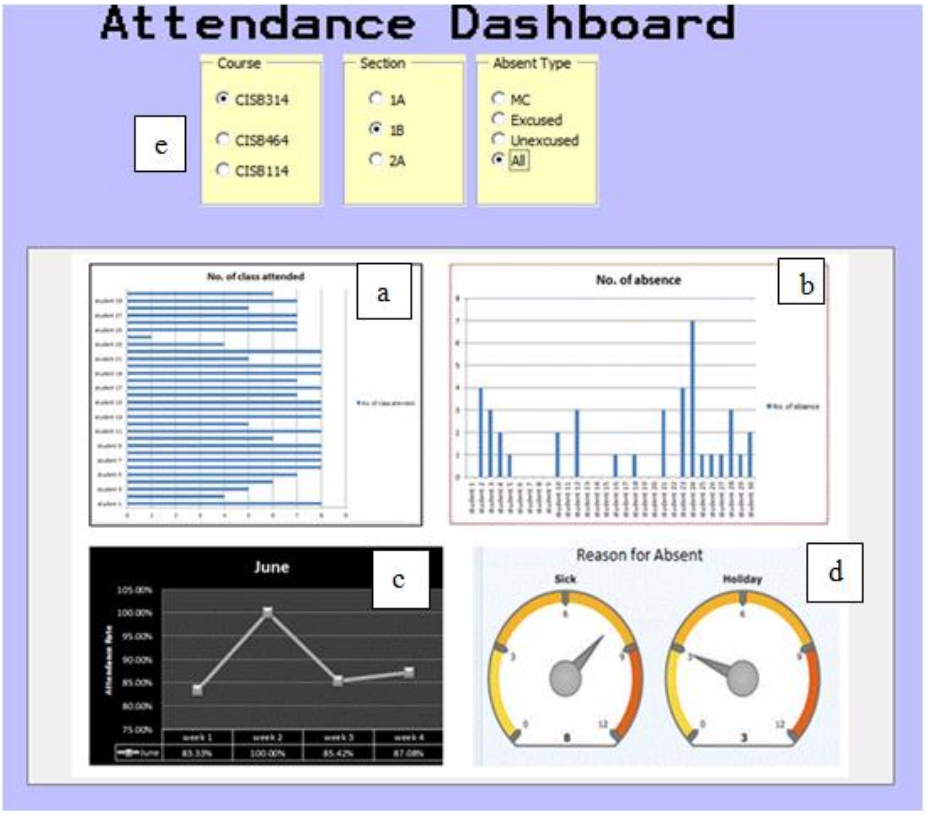
In South Leicestershire College, the goals for its dashboards include empowering the executive team and faculty heads to give them deeper visibility into performance at the general college of further education (Briggs, 2012).The dashboard also displays the college financial position related to income, expenditure and contribution. The key performance indicators include applications, enrollment and learning outcomes for students' dashboards.

Another system being used in Texas public schools called Texas Student Data System (TSDS) is to report and manage education data(Young etal., 2011). According to Young et al., the use of TSDS dashboards "allows educators to monitor student performance, see warning signs as well as growth opportunities early, and intervene appropriately, thus ensuring each and every student avoids failure and reaches his or her full potential" (2011). Thus, the introduction of TSDS really helps the schools in managing their education data.

3. PROPOSED ATTENDANCE DASHBOARD

Figure 2 below is the proposed interface for the attendance dashboard. The interface of this dashboard is designed by taking into account the elements of good dashboards. It allows the lecturer to quickly glance through the information and able to understand the information easily in one screen. This dashboard is also simple to use, interactive and able to drill down certain information. A lecturer needs to choose the course, section and absent type. The information is displayed according to input by the lecturer. In this example, data is assumed to be entered manually through the system interface using indicator such as 1 for present, 2 for absent (excused) and 3 for absent (non-excused). The figure below shows a dashboard for course CISB314, section 1B.

Figure-2. Attendance Dashboard



By using this dashboard, the lecturer will be able to comprehend and get the important information easily by looking at the objects and graphs since all information is represented visually. Below is the explanation of the dashboard according to label (a – e):

a. This information shows how many times the students have attended the class. Each student has his/her own indicator which makes it easy for the lecturer to monitor.
b. This information shows the absence rate of each student. From the graph, a lecturer can point out who has the highest number of absences and thus, may take necessary actions. If

the absent rate reaches certain point that the lecturer needs to be aware of, an alert will be displayed. The affected bar will be highlighted in different colors.

c. This graph shows a weekly summary of attendance rates. Based on this information, lecturer would know which week has the lowest attendance rate and find out the reason behind this problem. The details of the attendance will be displayed by clicking on the week's name.

d. This information shows the summary of reasons for absent. There are two types of absence: excused absence and unexcused absence. Excused absence is normally when a student produced a medical certificate or concrete reason for being absent. Unexcused absence is when the student did not attend the class without valid reasons. This gauge dashboard will also shows an alert signal if any negative indicator presents.

e. These choices are for the lecturer to choose which course and which section she/he is going to analyze. The information in the graphs will change according to the selection done by the lecturer.

4. DISCUSSION AND FUTURE WORK

To create the attendance dashboard, we use daily attendance rate as the metric. This is in line with a study for TSDS project which used daily attendance rate which is "the frequency of days present and trends overtime" as the metrics (Young et al., 2011). This is used as a metric because according to (Allensworth& Easton, 2007), attendance is the single largest variable in course failures among Chicago ninth graders. In fact, course attendance has shown to be eight times more predictive of failing a course in the ninth grade than the eighth grade test scores (Allensworth& Easton, 2007).

Another metric to be included in our future research is student tardy rate which is the percent of days a student is tardy during the last four weeks, last eight weeks and entire semester. This is because, by being late to class, students will also miss a lot of information from the class. This eventually leads to low performance in the course.

A part from that, we also plan to create several other dashboards in order to monitor student's performances. These dashboards will be integrated later and become a web based application which later may be accessed and used by students, parents, advisors and lecturers at any time.

5. CONCLUSION

Based on the discussion above, it is proven that attendance dashboard is very useful in managing student's attendance. Through the creation of attendance dashboard, early warning systems may help lecturer to determine which students are at risk of violating the attendance policy and subsequently warn the student. Thus, the possibilities of students being barred from taking the final exam will be reduced.

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