

**SIBERPROP : ONLINE COURSE APPLICATION AND ANALYSIS  
SYSTEM AT TUANKU BAINUN LIBRARY,  
UNIVERSITI PENDIDIKAN SULTAN IDRIS (UPSI)**

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**ABSTRACT**

*Transformation in academic libraries involves new services, facilities and user engagement programs, including in-house systems development for library staff and users. Since the development of the Internet during the past four decades, libraries have transformed their roles to satisfy user requirements. Manual processes of library services are being converted to online systems to accelerate and further improve the effectiveness and delivery systems of library processes. The in-house systems developed by academic libraries specifically UPSI library aimed in providing enhanced and value-added delivery services to users. SiberPROP has been developed to manage user education classes and simplify current workflow for both users and administrators. Utilizing open source software development methodology, SiberPROP has proved an effective piece of technology that helps enrich library services.*

**Keywords:** SiberPROP; Online Training Registration System; Online Training Analysis System; Training management

**ABSTRAK**

*Transformasi pada sesebuah perpustakaan akademik melibatkan perkhidmatan baharu, fasiliti dan program bersangkutan pengguna. Ini juga termasuklah melibatkan pembangunan sistem secara dalaman yang dikhususkan untuk pengguna dan kakitangan Perpustakaan. Semenjak pembangunan Internet empat dekad kebelakangan ini, Perpustakaan juga mengorak arus yang sama di dalam mentransformasikan peranan di dalam memastikan kepuasan pengguna di capai. Kaedah manual yang digunapakai telah ditukarkan kepada berasaskan sistem atas talian untuk memacu dan memperbaiki kaedah penyampaian yang lebih efektif. Pembangunan sistem dalaman yang diusahakan oleh kebanyakan perpustakaan akademik termasuklah Perpustakaan Tuanku Bainun, UPSI adalah bertujuan untuk menghasilkan nilai tambah perkhidmatan kepada pengguna. SiberPROP telah dibangunkan untuk menguruskan aspek sesi kelas*

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*pendidikan pengguna di samping mempermudah gerak kerja kedua-dua entity pelanggan dan pentadbir sistem. Ianya dibangunkan menggunakan kaedah pembangunan sistem sumber terbuka dan telah terbukti SiberPROP berjaya memperkayakan perkhidmatan Perpustakaan.*

**Kata Kunci:** SiberPROP; Sistem Pendaftaran Latihan Atas Talian Software; Sistem Analisis Latihan Atas Talian;; Pengurusan latihan

## **INTRODUCTION**

Transformation in academic libraries involves new services, facilities and user engagement programs, including in-house systems development for library staff and users. Certainly the proliferation of information technologies has made a significant impact on libraries in the way they deliver their services and content as well as the format of that very content as most libraries move towards digital collections or at the very least hybrid print and digital collections (Sidorko, 2007).

Since the development of the Internet during the past four decades, libraries have transformed their roles to satisfy user requirements. Manual processes of library services are being converted to online systems to accelerate and further improve the effectiveness and delivery systems of library processes.

The in-house systems developed by academic libraries specifically UPSI library aimed in providing enhanced and value-added delivery services to users. This will also improve the efficiency to library users as well as the community as a whole. Moreover, with a crack in-house development staff, firms also may be able to make tweaks and upgrades to homegrown software more quickly and with pinpoint precision (Dysart, 2012).

Tuanku Bainun Library or *Perpustakaan Tuanku Bainun* (PTB) of Universiti Pendidikan Sultan Idris (UPSI) has developed in-house systems to ease librarians and patrons in accomplishing a number of key library related tasks. In 2009, PTB's own iSYS system won two main innovation competitions that recognized the ability of PTB in-house software development unit. iSYS is an indexing system which indexes newspapers, articles in journals and magazines into a reliable storage for easy retrieval. Up until early 2014, iSYS has handled more than a thousand records with about one hundred concurrent active users per day. iSYS implementation marked a new era of in-house system development at the library.

Since then, PTB in-house system development accelerates and published several key library applications namely Pustaka Vendor Rating System (VRS), Reading

List System (RL.sys) and the newest system, SiberPROP. Below are the descriptions of all three.

| <b>System</b>                      | <b>Year started</b> | <b>Purpose</b>  |
|------------------------------------|---------------------|---|
| Pustaka Vendor Rating System (VRS) | 2009                | Vendor rating and evaluation system which is used to evaluate vendors' performance and compares them for future library acquisition.  |
| Reading List System (RL.sys)       | 2010                | RL.sys development is to fulfill the requirement of the library's Collection Development and Management Division in order to keep track of the current status and availability of the university's reading lists. |
| SiberPROP                          | 2013                | SiberPROP is used to ease the management of registration, administration and monitoring of user education classes.  |

Table 1: In house systems developed by PTB since 2009

In this article, we will elaborate more on SiberPROP and how the library manages user education classes in its unique way, and of course describing the hurdles that we have met along the way.

### **LIBRARY USER EDUCATION CLASSES**

Since its introduction, new students of UPSI are required to register user education classes. Students have the flexibility to choose the time at their own convenience. The schedules for user education classes are prepared by the librarian. The teaching modules have been carefully predefined so that students know what they are going to learn in the class. Listed below are the modules:

1. Introduction to the library
2. Infotrack (Web OPAC) usage skills
3. Pustaka Knowledge Portal usage skills
4. Online databases usage skills
5. Library guided tour

During the two-hour period, students will be encouraged to ask questions especially on how to find information on various library resources, facilities and services.

### **Declining Student Attendance**

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In 2013, prior to the introduction of SiberPROP, we were seeing declining trends of students signing up for user education classes. In 2012, only 26% of the total number of students attended user education classes. This declining trend happened because of a number of causes that will be discussed later. The figure below described a more complete analysis:

| <b>Year</b> | <b>Total no. of new students</b> | <b>Total registered for classes (%)</b> | <b>Total number of attendees (%)</b> |
|-------------|----------------------------------|---|--------------------------------------|
| 2010        | 2,382                            | N/A                                     | 1,043 (44%)                          |
| 2011        | 2,203                            | N/A                                     | 933 (43%)                            |
| 2012        | 1,662                            | 918 (55%)                               | 432 (26%)                            |

Table 2: Source: Team OASIS KIK 2013 presentation slides

The drop in numbers was very significant that the management of PTB thought of ways for improvement. A task force team has been established in late 2013 by means to overcome the issue and thus created a creative and innovative (KIK) group project comprising library staff. Their research and findings has brought to the following causes of decline in registration and attendance:

- a. Registration was done manually
- b. There was no reminder on the schedule for students
- c. Lack of cooperation with the faculties
- d. Course framework was not provided during registration

The main cause of all issues, is that the registration has to be done manually at the counter near the main entrance of the library. This was considered as a major issue for students as most of their classes were held at the Sultan Azlan Shah campus (KSAS), which was located about 10 kilometers from the Sultan Abdul Jalil Shah (KSAJS) campus (where PTB was located). Registration at that time was done by manually inputting students' particulars on registration sheets. This sort of registration has brought to the second factor of declining attendees in which no reminder was sent to the students before the actual date of their classes.

Although the students' registrations were noted down on papers, there was no method to remind them about their classes. So, most of them stated that they did not remember the dates of their classes and of course, hence never attended the user education classes.

The third cause was lack of visible cooperation with the faculties. There were no proactive roles and efforts to urge faculties to get their students to register for user education classes. The library had put up posters at the campus to promote

the classes and collaboration from the faculties would ensure the success of the library programs, which did not happen at most times.

Lastly, the course framework was not provided during registration that made it difficult for students to get a glimpse of what they were going to learn during user education classes. Therefore most of them decided not to attend the classes as they thought they could manage to learn by themselves somehow by navigating the library website. The course framework was shown on screen at the beginning of every user education class to minimize the cost of printing the course framework to be given out to students.

| Cause                               | Survey dates (2013) |           |            |            |            |            | Total      |
|-------------------------------------|---------------------|-----------|------------|------------|------------|------------|------------|
|                                     | 12/8                | 13/8      | 14/8       | 15/8       | 16/8       | 17/8       |            |
| Manual registration                 | 19                  | 3         | 36         | 33         | 32         | 40         | 163        |
| No reminder                         | 21                  | 4         | 42         | 36         | 31         | 47         | 181        |
| Less cooperation with the faculties | 10                  | 1         | 13         | 21         | 14         | 20         | 79         |
| Course framework is not provided    | 16                  | 3         | 37         | 23         | 29         | 32         | 140        |
| <b>TOTAL</b>                        | <b>66</b>           | <b>11</b> | <b>128</b> | <b>113</b> | <b>106</b> | <b>139</b> | <b>563</b> |

Table 3: A survey was done to study the causes of declining attendees for user education classes.

(Source: Team OASIS KIK 2013 presentation slides)

### **SIBERPROP – THE SOLUTION**

With all the factors explained and well documented, the team decided to build a complete all-in-one web based system. The library top management had consented to the idea and gave their full support to the development of in-house system for user education program. The system should meet the following ‘must have’ criteria:

1. User-friendly interface for student to register for classes and be reminded of their registration schedules.
2. Integration of administration aspects of the system for administrators to manage, monitor and facilitate classes.
3. The system must be able to generate predefined report with graphs and figures and later exportable to Adobe DF format.
4. After-class evaluation module which required users to evaluate their facilitators (librarians) and the overall performance of the class.

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When all the requirements were finalized and approved, the team assigned the library's Information Technology Officer to develop a full in-house working system within two months. The development began in early September 2013 and completed by the third week of October 2013. The system has been named as *SiberPROP (Sistem Bersepadu Program Pendidikan Pengguna)* or the Integrated System for User Education Program.

#### **OPEN SOURCE INITIATIVES**

The development of *SiberPROP* was entirely created using open source software. Hypertext Preprocessor (PHP) web programming language had been chosen to develop the user front end and MySQL Community from Oracle for the database. MySQL had been taken into consideration because of its flexibility and provided a large support from the open source community.

The user front end was also customizable via the implementation of Cascade Style Sheet (CSS) layout. CSS enabled system developer to change the layout design of a web page without interfering with the source codes. Therefore, if one decided to change a button layout or website color scheme, a web programmer had to change a single CSS file only. All this could be done without going through hundreds or thousands of lines of codes.

By utilizing the open source development platform, there would be no direct cost applied to the library, in addition to newer versions of the platform may be updated free of charge. PHP and MySQL were also globally known as the first choice of web based system development. The finalized system was then being put into a server that was installed with open source operating system, CentOS (abbreviated from Community Enterprise Operating System). CentOS was a free enterprise class computing platform which aimed to be 100% binary compatible with its upstream source, the Red Hat Enterprise Linux. The installation of *SiberPROP* was done on PTB own server that shared its resources with several other existing systems. The server specifications was as shown in the following table:

|                      |   |
|----------------------|---|
| <b>Manufacturer:</b> | Dell  |
| <b>Model:</b>        | PowerEdge T110 II                                     |
| <b>CPU:</b>          | Intel(R) Xeon(R) CPU E3-1220 V2<br>@ 3.10GHz, 4 cores |
| <b>RAM:</b>          | 8GB   |
| <b>OS:</b>           | CentOS 5.9  |

Table 4: *SiberPROP* server main specification

The cost of the server, during the time of purchase was just well under RM5,000.00 (about USD1,500). The server also served another two PHP-based systems simultaneously with SiberPROP proving that it was very capable and reliable.

### USER INTERFACE (UI) DESIGN

The main goal of designing the UI of the scale of project such as SiberPROP was that it should be ‘easy on the eyes’, ‘easy to use’ and ‘easy to navigate’. The three ‘easy’ factors were what drove SiberPROP as a proven success later. The main interface consisted of big icons and minimal text descriptions. SiberPROP was also built for mobile devices that would benefit devices with touch screen facilities. Mobile users demand that you deliver more with less, and the old rules of website design and implementation for the desktop need a lot of adaptation to create a slick mobile Web-app experience (Nicolaou, 2013).

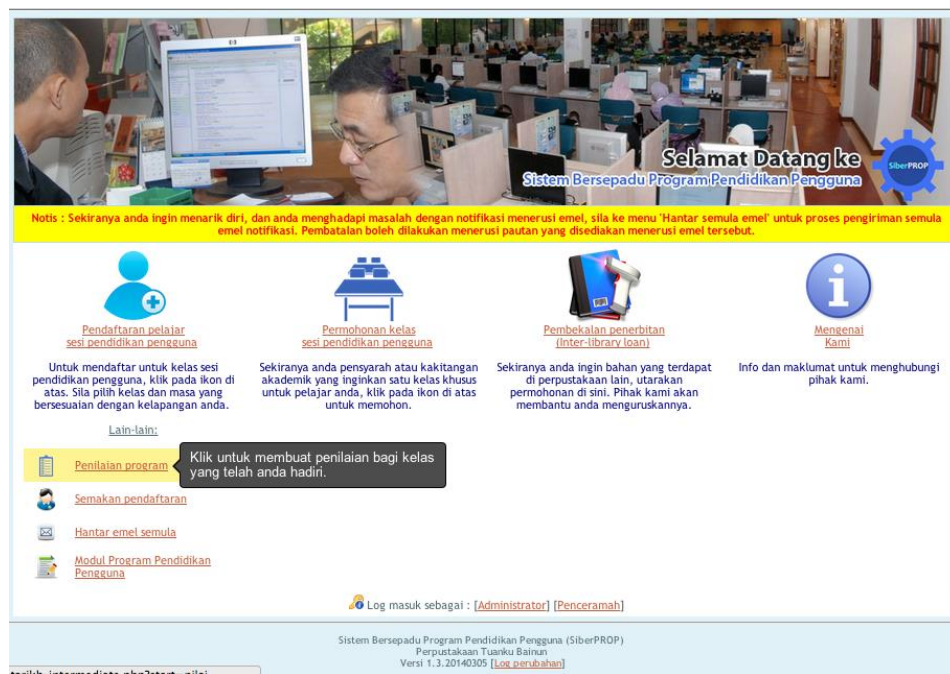


Figure 1: Screenshot of main interface of SiberPROP version 1.3 on a computer screen that also include built-in Inter Library Loan module

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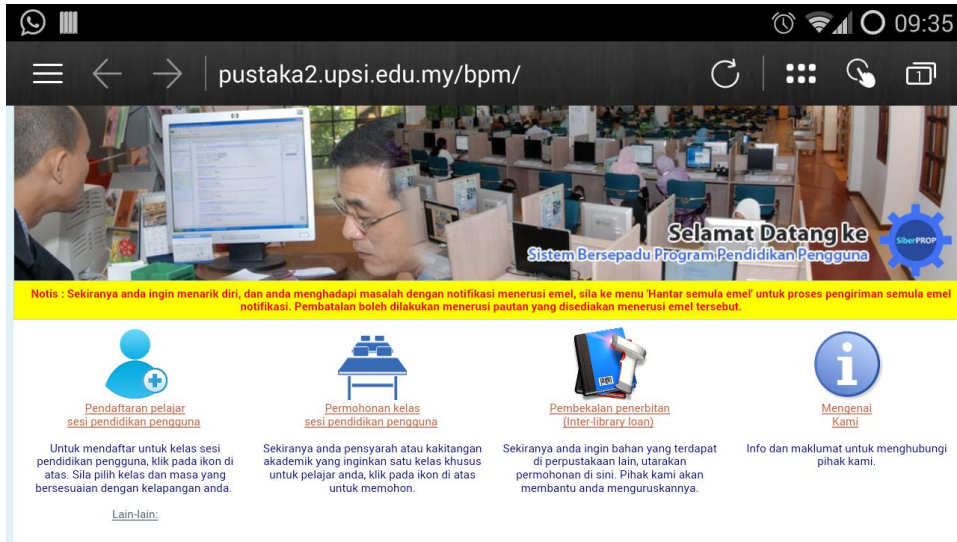


Figure 2: Screenshot of main interface of SiberPROP version 1.3 as displayed on Android device

The interesting aspect upon designing the UI was that the final system only weighed about 5.9 Megabytes on the server storage, complete with optimized images, documentations and additional JavaScript library. This lead to smaller user downloads per HTTP request. Benchmarking has been done using an independent network connection. SiberPROP main page loaded well under 760 milliseconds while Google main search page loaded in 2.08 seconds.

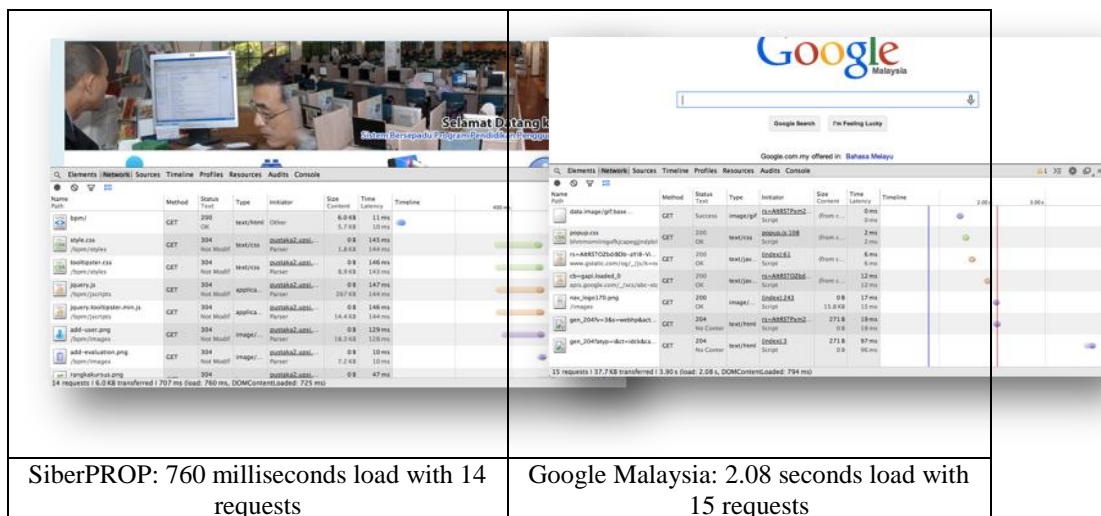


Figure 3: Load speed benchmark conducted on independent network connection



Students would register for user education classes by clicking on the registration icon and they would have an option to select the class at their convenience. The user education class list had indications to show whether the class was full or not. Students could also walk-in to join any classes available in the schedule.

| Januari 2014 |       |        |      |        |        |       |
|--------------|-------|--------|------|--------|--------|-------|
| Hari Ini     |       |        |      |        |        |       |
| AHAD         | ISNIN | SELASA | RABU | KHAMIS | JUMAAT | SABTU |
| 29           | 30    | 31     | 1    | 2      | 3      | 4     |
| 5            | 6     | 7      | 8    | 9      | 10     | 11    |
| 12           | 13    | 14     | 15   | 16     | 17     | 18    |
| 19           | 20    | 21     | 22   | 23     | 24     | 25    |
| 26           | 27    | 28     | 29   | 30     | 31     | 1     |

| PILIH SLOT TARIKH DAN MASA |                        |                    |             |  |  |
|----------------------------|------------------------|--------------------|-------------|--|--|
| Tarikh                     | Masa Mula - Masa Tamat | Kump. Petajar      | Lokasi      | Penceramah                                 | Pilihan  |
| Januari 2014               |                        |                    |             |  |  |
| 1                          | Tue 21-01-2014         | 8.00 AM - 8.30 AM  | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Khairul Asyrani Sulaiman<br>Walk-in<br>Kekosongan: 22  |
| 2                          | Wed 22-01-2014         | 8.00 AM - 12.30 PM | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Khairul Asyrani Sulaiman<br>[Daftar]<br>Kekosongan: 24 |
| 3                          | Tue 28-01-2014         | 8.00 AM - 8.30 AM  | PRASISWAZAH | Makmal Latihan IT, Aras Bawah Perpustakaan | Afzanizam Dullah Hashim<br>[Daftar]<br>Kekosongan: 24  |

[\[Ke laman utama\]](#)

Figure 4: Screenshot of student registration module

As for any student's particulars, email address was a mandatory field. This was because all notifications would be redirected to their emails. The following were notifications that students would be receiving :

- Registration details with link to cancel their own registration and a reminder notice
- Notification of any cancelled user education class

For administrators, upon successful login, they would view several more additional administrative modules as follow:

- Create and modify user education class
- Generate useful reports and statistics (exportable to PDF format)
- Change facilitator for a class
- Manage students registration data
- Create new system user as administrator or facilitator

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There were two types of system users for SiberPROP, namely administrator and facilitator. Administrator managed and controlled all aspects of the system while the facilitator had a very limited access to the following:

- View a complete user education class schedule
- Close a user education class upon completion
- Change their current assigned class with another facilitator (with email notification)
- Check for student registration details, attendance and print student list

| KAWALAN TARIKH DAN MASA |  |                    |  |                               |                         |                          |                                       |
|-------------------------|--|--------------------|--|-------------------------------|-------------------------|--------------------------|---------------------------------------|
| Tarikh                  | Masa Mula - Masa Tamat                           | Penceramah         | Kump. Pelajar<br>PRA   PASCA<br>  SEMUANYA | Status<br>ON   OFF  <br>BATAL | Kelas<br>(Hadir/Daftar) | Statistik                | Opsyen                                |
| Januari 2014            |  |                    |  |                               |                         |                          |                                       |
| 117                     | 21-01-2014<br>[TEMPAH<br>LOKASI]<br>[PERMINTAAN] | 8.00 AM - 8.30 AM  | Khairul Asyrani Sulaiman<br>[Set] [Batal]  | PRASISWAZAH                   | [ON]                    | SENARAI<br>PELAJAR (1/2) | [STAT<br>(0)]<br>[BATAL]<br>[LAPORAN] |
| 115                     | 22-01-2014<br>[TEMPAH<br>LOKASI]<br>[PERMINTAAN] | 8.00 AM - 12.30 PM | Khairul Asyrani Sulaiman                   | PRASISWAZAH                   | [ON]                    | SENARAI<br>PELAJAR (0/0) | [STAT<br>(0)]<br>[BATAL]<br>[LAPORAN] |
| 116                     | 28-01-2014<br>[TEMPAH<br>LOKASI]<br>[PERMINTAAN] | 8.00 AM - 8.30 AM  | Afzanizam Dullah Hashim                    | PRASISWAZAH                   | [ON]                    | SENARAI<br>PELAJAR (0/0) | [STAT<br>(0)]<br>[BATAL]<br>[LAPORAN] |

Figure 5 : Screenshot of class management interface for administrator

### ACCESS SECURITY

For a web-based system, security was an important aspect to look into. Therefore, for selection of any field in SiberPROP database, encryption has been enforced using AES-256 standard. Restrictive pages have also been locked by utilizing PHP session function so that only authenticated session may be given the viewing. As for database, which was in the same server as the PHP codes, it had been locked and only allowed access from within the library's own Intranet network. This was to ensure that no unverified access could view or edit the database content, which was critical for any system.

### EFFECTIVENESS STUDY

Since the introduction of SiberPROP, it was interesting to know that the library had seen a most significant increase in both registration and attendance records for user education classes. Below were the graphs that showed the effectiveness of SiberPROP:

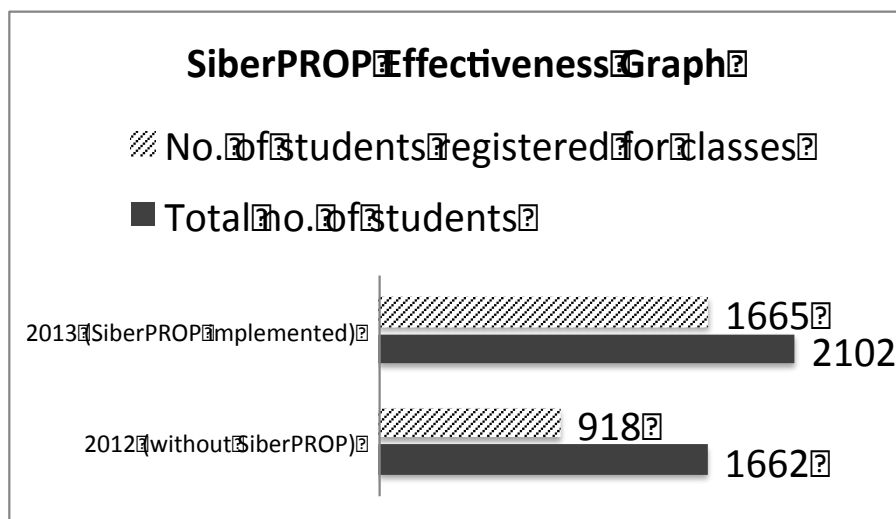


Figure 6: SiberPROP Effectiveness Graph  
(Source: Team OASIS KIK 2013 presentation slides)

As shown in the above graph, the increase of over 76% in 2013 where students registered for classes as compared to 55% in 2012 against the total number of students in UPSI. This significant increase of registration proved that SiberPROP can be accessed anywhere as long as there was an Internet connection. This helped in increasing the number of registration among students.

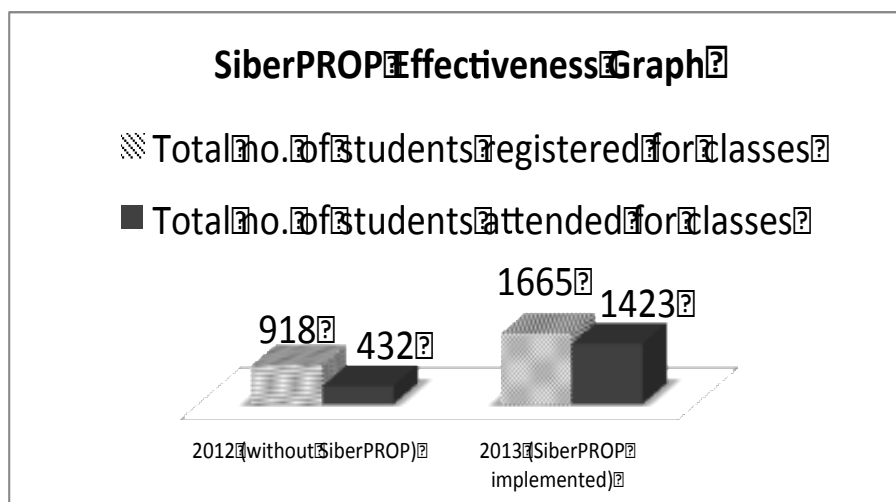


Diagram 2: SiberPROP Effectiveness Graph  
(Source: OASIS KIK 2013 team presentation slides)

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The total number of students registered and later attended a class had also increased. By looking at the above graph, in 2012, only 47% of student registered for classes had attended them; while in 2013, the number was almost 85%. This was a very convincing fact to the library. Students have been carefully reminded about their classes to improve attendance. In addition to that, registration could take place anywhere and was not confined to the campus area as long as there was a device with internet connection. This was compared to only one location which was at the library counter prior the implementation of SiberPROP.

### **COMMERCIAL POTENTIALS**

Since the success of SiberPROP the library have been surveying the commercial potential of the product. The fruition of success generated output for the library management to identify SiberPROP as a complete all-in-one system for handling course registration, course scheduling and course evaluation. It also had a superior backend for system administrators to manage classes, facilitators and output reports automatically without the need to use any third party standalone computer software. So, not only libraries would benefit from the usage of SiberPROP but also any other organizations or agencies looking for a complete training plus evaluation management system for any courses within their environment.

### **FUTURE TRENDS AND DEVELOPMENT**

The future of in-house software development for the library is looking bright and promising. By designing and coding our own needs, we have managed to save hundreds of thousands of government funds that can be diverted into other acquirement of product or services. Well-developed applications that have commercial values could bring the university some income that can be invested to make our library a better place for all users and the community.

PTB will be actively developing in-house systems to meet the requirements of library staff and users. The delivery services will gradually be transformed from manual-based to online systems to meet the changes and developments in library trends as well as information and communication technology.

### **REFERENCES**

- Dysart, Joe. 2012. Roll your own software. *ABA Journal*. Vol. 98, no. 3, 29
- Nicolaou, A. 2013. Best practices on the move: Building Web apps for mobile devices. *Communications of the ACM*, Vol.56, no. 8, 45-51.
- Sidorko, Peter Edward. 2007. Fostering innovation in library management and leadership. *Library Management*. Vol. 28, no. 1/2, 5-16.