

Course Profiling System

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ABSTARCT

Course Profiling System (CPS) is a document management system for self-evaluation of first degree programmes at Private Higher Education Institutions (PHEIs). The framework provides systematic compliancy-checking of curriculum design with the Malaysian Qualifications Agency (MQA) Minimal Standards; and a more hollistic view of the programme and its constituent courses. The novelty is the system's design that reduces efforts and errors inherent in manual process. Apart of serving as a repository and retrieval of course profiles, CPS is also a platform for managing and monitoring the quality of PHEI's programme for application and upkeep of MQA accreditation or renewal.

Keywords

Course management, course curriculum design, document management system, content management system.

1.0 INTRODUCTION

The Private Higher Educational Institutions Act of 1996 requires all programmes conducted by Private Higher Education Institutions (PHEIs) to be approved by Ministry of Higher Education (MOHE). The approval is based on recommendation by the Malaysian Qualifications Agency (MQA). The programmes are audited to ensure compliancy with the Minimum Standards and subjected to a regular monitoring [1].

MQA conducted classification of tertiary education in Malaysia based on the Malaysian Qualifications Framework (MQF) [2, 3]. For a first degree programme, the Minimal Standard is based on the MQF Academic Sector Level 6 [3].

The self evaluation, as required by MQA, involves both serial and parallel activities at the operational and management levels of PHEI: curriculum planning; drafting/restructure of course syllabi; and compliancy review. Periodically, reports of the programme is submitted together with the application for accreditation or renewal. An audit

committee from MQA evaluates the reports, providing feedbacks as necessary and may recommend accreditation of the program to the MOHE.

2.0 PROBLEM STATEMENT

The manual self-evaluation process is tedious and prone to error but important. The process is complex because it involves many users at various stages of evaluation for every constituent courses in the programme. It usually takes months of efforts and coordination of various parties with different interest but a common goal.

3.0 OBJECTIVE

To streamline the self-evaluation process for accreditation by automating repeatable tasks and providing measures to detect and minimize incompliancy with MQF.

4.0 BACKGROUND

The first degree programme is taken by freshmen applicants out of high schools, matriculation programmes, diploma programmes or equivalents. Upon completion, the undergraduate will be conferred a bachelor's degree in a specific field of study [4]. In the Malaysian case, a constant monitoring by the MOHE ensures that the programme offered meets the Minimum Standard at the national level. The Minimum Standard is defined by the Malaysian Qualification Framework (MQF) [2, 3]. MQA is the arm of the MOHE in ensuring that tertiary academic institutions provide education that meets the quality set. The organization conducts audit on tertiary institutions periodically and may award accreditation to deserving insitutions [1,2].

5.0 SIMILAR WORKS

Creating a course is similar to content creation activity in that it commonly involves multiple authors [5] with the purpose of aligning it with the organizational goal [6]. A Content Management System (CMS) can be used to support

the collection, creation, administration, publication and distribution of information [5] by applying business rules or editorial processes.

Learning System developed by Mcelwarth Linday Kay is a customized electronic course of study. The system automatically generates learning modules based on contents identified for a particular course and learning preferences of the user profile [7].

In Queensland University, Australia, an electronic course profiling system is used to generate profiles for graduate and undergraduate courses as well as streamlining the examination administrative processes [8].

In a document management system, the foreground and background processes are differentiated for security reason [9, 10, 11, 12]. Foreground elements limits the actors to the actions whereas the background elements provide automation system, such as credit hours calculation, and feedback functions [9].

Synthesis on published information from academic and professional institution suggested that the system is an innovative initiative.

6.0 METHODOLOGY

Iterative development model using evolutionary prototyping, Figure 1, is suitable for online systems with heavy user interactivities [13, 14, 16].

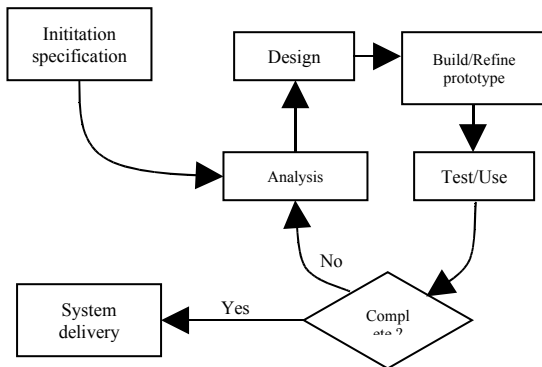


Figure 1: Evolutionary model

The model allows development to begin as early as the first part of the system. The initial version, called interim is used to collect immediate feedbacks from the users. The requirement specification of the design is updated with addition of new functionalities to be coded and tested [14, 15].

7.0 ANALYSIS

Requirement study is conducted by interviewing individuals with experience in the manual process at various levels: administration and senate, education development unit, programme coordinator, and course instructors.

Programme and course management is one of the factors with bigger weightage in the evaluation. About 79% of the report content submitted by PHEI to MQA auditors was on the programme and course curriculum. On the other hand, 60% auditor's feedback report is on curriculum and course syllabi [17].

7.1. Factors attributing the quality of a programme [7]:

- a. Programme
 - admission requirements
 - programme delivery methods
 - total credit hours and duration
 - total student intake
- b. Course
 - Classification/course group
 - Credit hours
 - Schedule of delivery (semester)
- c. Instructor
 - Number of staffs
 - Qualifications
 - Experience
- d. Physical Infrastructure
 - Lecture halls
 - Tutorial/Discussion rooms
 - Laboratory
 - Audiovisual aids
 - Library facilities
- e. Management System
 - Curriculum committee
 - Academic record management
 - Student services
 - Evaluation and grading system
 - Quality control of courses
 - Staff training and development
- f. Miscellaneous
 - Research activities

7.2 Stakeholders

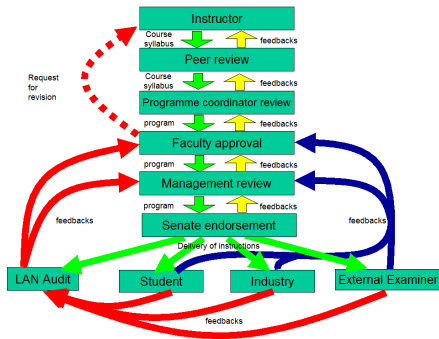


Figure 2: Workflow indicating levels of course reviews and approvals

The curriculum structure of the programme has to satisfy the following requirements:

- Compliance with the national education policy as outlined in MQF.
- Meeting the institution's educational goals.
- Alignment with industry interests and human resource requirements.
- Providing quality education to students.
- Providing unified view and reference of all courses to instructors.

The following matters, as illustrated by figures 2-4, are checked:

- Peer review checks for completeness and suitability of the course syllabus;
- Programme coordinator checks for compatibility with other courses in the similar programme
- The management addresses strategic concerns.
- Finally, the programme is endorsed by the senate before applying for accreditation or renewal to MQA.

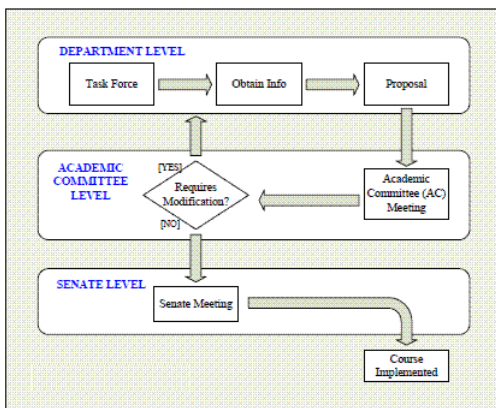


Figure 3: Various levels of stakeholders involved in authoring a new course syllabus.

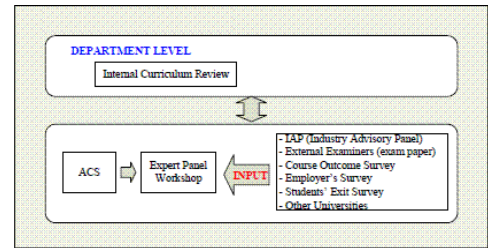


Figure 4: Various levels of stakeholders involved in a course restructuring.

7.3 Requirements

7.3.1. Functional:

- To create a centralized repository of program, courses and instructors information.
- To assign instructor with matching qualification to the courses.
- To provide online access to programme, courses and instructors information.
- To direct the curriculum to the next stage approval
- To collect review feedbacks through the system.
- To alert the instructor so that appropriate corrective actions can be taken.
- To control the publication of the courses and versioning.

7.3.2. Non-functional:

- To provide access within acceptable delay (8-second rule).
- To provide access authorization.
- To provide correct level of access and modification to the user and the corresponding documents.
- To provide back-ups of the contents.

7.4. Use Case

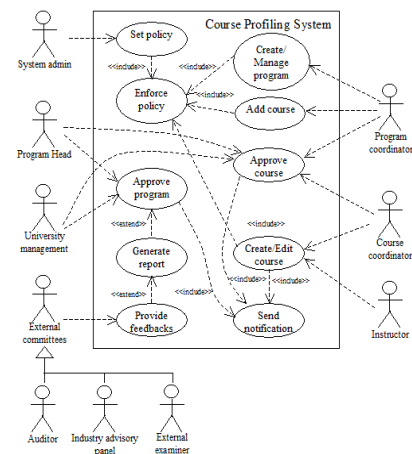


Figure 5: Use case of CPS

Table 1: Case description

Case	Description
Set policy	To set access level, and the requirements expected of the programme and courses.
Enforce policy	To ensure workflow adheres to the policy.
Manage program	To create or revise program design, i.e. courses to be offered, categorization, credit hours weightage and schedule.
Add course	To add to programme and set course category and instructor.
Create/Edit course	To create a new or edit existing course syllabus. Constrained by "Enforce policy".
Approve course	To review and approve courses.
Approve programme	To review and approve programme
Send notification	To send automatic notification of changes.
Generate report	Provide overall compliance of the programme and courses.
Provide feedbacks	To capture feedbacks of external reviewers and auditors.

7.5. ERD

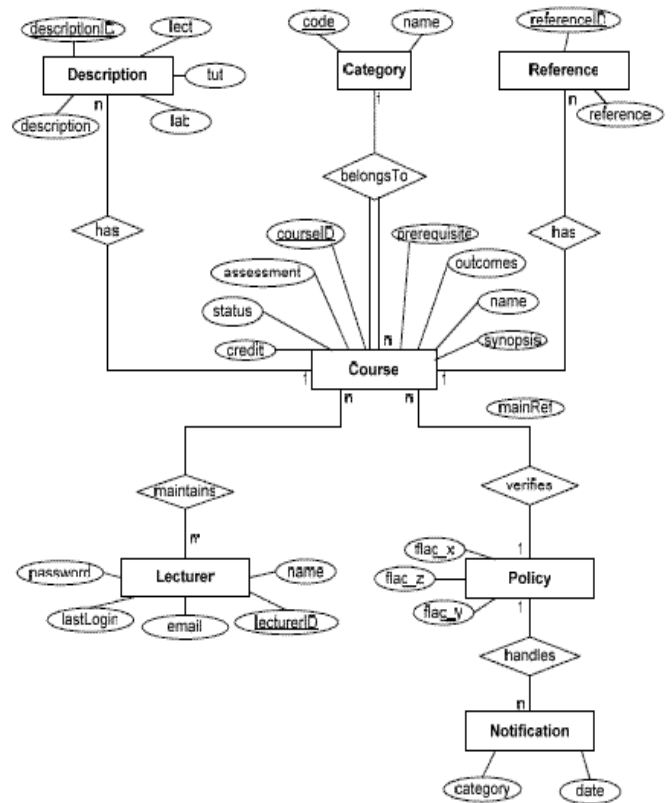


Figure 6: Entity Relationship Diagram

8.0 DESIGN

8.1. Activity diagram

The system provides multiple interfaces to multiple users with multiple access levels that allows viewing or modification of the system's information. Access is controlled through password login and access level assigned.

In figure 7, the work flow supports various inter-related activities in a multi-user environment.

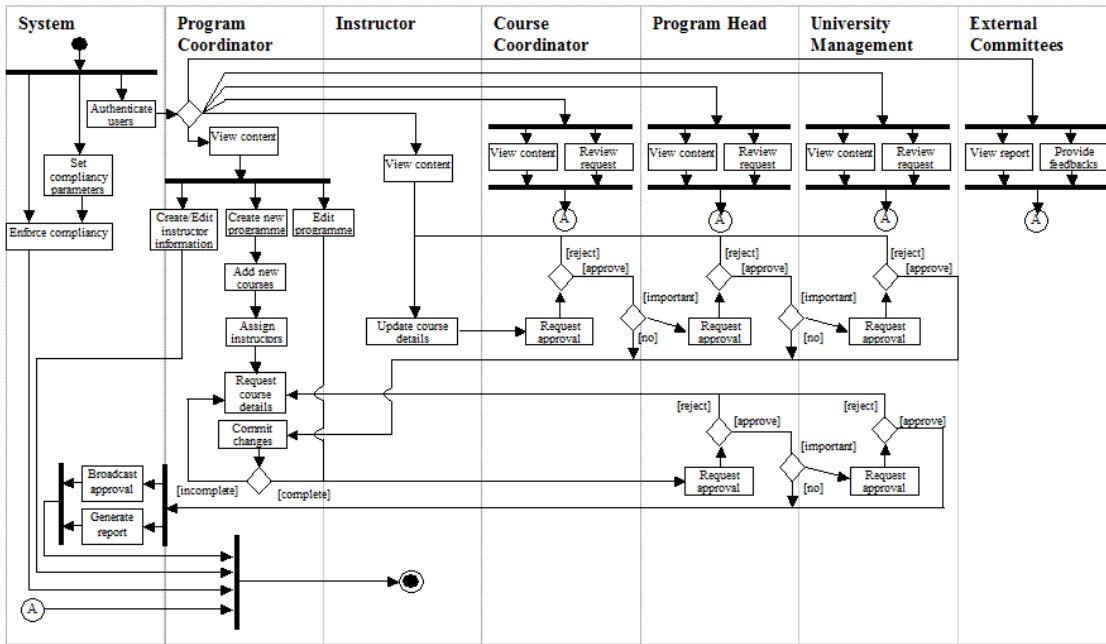


Figure 7: Activity diagram showing CPS work flow

Basically, there are two main activities:

- creation, update and reviewal of courses;
- creation, update and reviewal of programme;

To support the activities, the following functionalities are provided:

- template for program/course creation
- workflow controls for cascaded review and approval of proposed program/course change(s).
- Automatic credit hours checking to ensure compliancy with course, course group and programme total credit hours requirement.

As there may be a few authors to the similar document, controls on the access level must be provided to different parts of the document. Some details of the courses are automatically filled by the system according to programme requirement. Some of the details are editable whilst some are not due to insufficient access level. The programme or course

needs to be approved by all the review stages and endorsed by the senate in order to become publishable.

architecture. Data-driven architecture promotes data integrity. Centralized repository ensures that everyone has access to the latest update and prevention of redundant copy of data. 3-tier architecture allows better accessibility by allowing different interface clients used.

Reliability and performance is achieved by using proven Apache-PHP-MySQL technology. PHP-MySQL, in an unofficial survey by NetCraft, is concluded to be most favored combination for data-driven web application. Statistics on adoption by web hosts given by NetCraft showed sharp increase from 7,500 hosts in June 1998 to 410,000 in March 1999 [18].

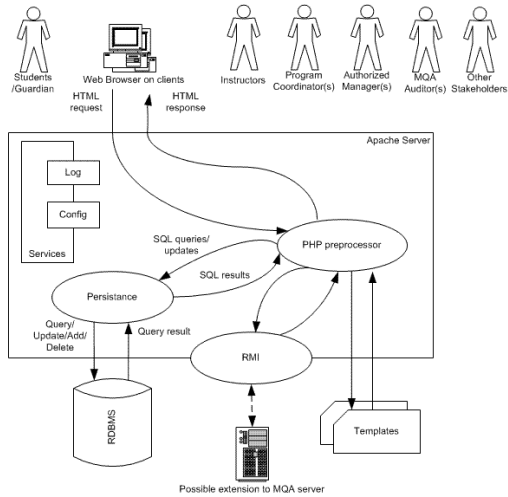


Figure 8: System architecture

MySQL is capable of handling large amount of data at high-performance, hence making it suitable for applications with relatively complex operations, such as CPS. To protect the data, users can revert to previous copy of published course or programme in case of erroneous changes. This is achieved by redundancy strategy in database by including back-up tables.

PHP, a popular server-side scripting for dynamic websites, is chosen because it blends well with MySQL database, provides fast response to query and support object-orientation. This allows instances to be created from PHP classes for repeated tasks, such as frequent database access and user authentication [19].

8.3. Interface design

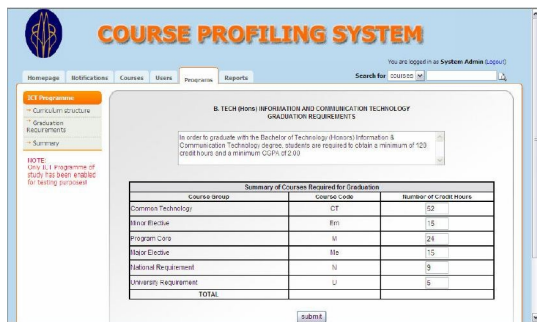


Figure 9: A programme is created by setting the credit hour allocation for course categories.



Figure 10: Courses are added to the programme. Instructors are assigned to it.

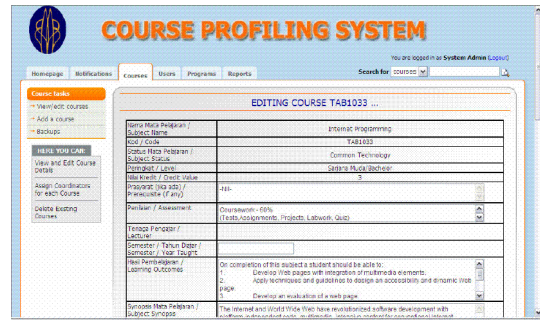


Figure 11: The instructor will be notified and will propose the details of the course.



Figure 12: The proposed course structure undergoes reviews and approval.

A working prototype based on the initial specification is to be developed. Actual data is entered into the system.

We carried out unit testing and system testing to inspect if the basic functionalities of the system are met. Acceptance testing is carried out by engaging instructors to use the system and collect the feedbacks on the interface through interview. The system had been tested on 10 users in a mock environment: 8 instructors and 2 program coordinators. Questions on ease of use, perceived benefits, disadvantages and enhancement opportunities were asked.

9. RESULTS AND DISCUSSION

Information gathered from stakeholders indicate the potential of the system to bring values to the process. Most test subjects found the interface intuitive with minimal learning curve. This is because the system's WYSIWYG design is similar to the manual documents.

Security-wise, the system protects the document from unauthorized modification through user authentication and approval mechanism.

With the system, the approval flow, notification, access control and calculation of credit hours are automated. This reduces tedious work because some parts of the documents are generated with certain details already filled in. In case of any change to the hours for example, the system automatically recomputes the changes.

Over all, benefits reaped are relatively more efficient preparation, review and approval of proposed curriculum structure of both programme and course. CPS adds values to the self-evaluation process.

10. CONCLUSION

The outcome of the research and development project is the design of a computer-based framework for systematic creation, review and approval courses and programmes offered by PHEIs as well as report generation. The novelty is the design that provides semi-automation of the self-evaluation workflow, which significantly reduces the amount of efforts and time.

CPS has the potential for further development and deployment at higher institutions of learning nationwide in order to streamline continuous self-evaluation important for the accreditation processes.

11. FUTURE WORK

More usability studies and requirement gathering are to be carried out with different set of test users from various stages of the workflow. There is also a potential to carry out study on differences with other institution, mainly at the public sector in Malaysia to assess the need for customizability of the system. The feedbacks received will be used to revise the system specification for enhancement.

12. REFERENCES

[1] Prof. Zita M. Fahmi, "Quality Assurance System in Higher Education", Quality Assurance in Tertiary Education, World Bank Learning Seminar: 2, 2006, 12 November 2008,

<<http://siteresources.worldbank.org/EDUCATION/Resources/malaysia-qa-system.pdf>>

- [2] Malaysian Qualifications Agency, 2008, 15 December 2008, <<http://www.lan.gov.my/pengenalan.cfm>>
- [3] Malaysian Qualifications Framework, November 2007, 15 December 2008, <www.lan.gov.my/mqf.cfm>
- [4] "Education in Malaysia", Wikipedia, 2009, January 15th 2009, <en.wikipedia.org/wiki/Education_in_Malaysia>
- [5] Jurrian Souer et. al., "Defining Operations and maintenance in Web engineering: a Framework for CMS-based Web Applications", Department of Information and Computing Sciences, Utrecht Univesity, Utrecht, Neatherlands, May 2007.
- [6] T. Byrne, Web Content Management Products and Practices, CMS watch v.6.0, The CMS report (enterprise edition), 2004.
- [7] Mcelwrath. L. K. "Learning System", esp@cenet, December 4th 2003, January 5th, 2008, <<http://v3.escapenet.com>>
- [8] The University of Queensland, " Electronic Course Profile System (ECP)", The University of Queensland, Australia website, July 2007, January 16 2008, <www.uq.edu.au/teaching-learning/newsletter/index.html>
- [9] Mark Ginsburg, "Intranet Document Management Systems as Knowledge Ecologies", Proceeding of the 33rd Hawaii International Conference on System Sciences, 2000.
- [10] Marijo Volarevie, Vito Strasberger and Elvis Pacelat, "A philosophy of the Electronic Document Management", 22nd International Conference Information Technology Interfaces ITI 2005, June 13-16, 2000.
- [11] Vidyaraman Sankaranarayanan et. al., "Detecting Masquerading Users in a Document Management System", University at Buffalo NY, 2006.
- [12] S. Newell, H. Scarbrough, J. Swan and D. Hislop, "Intranets and knowledge management: Complex processes and ironic outcomes.", 23rd Hawaii International Conference on System Sciences, IEEE, Sony Electronic Press, January 1999.
- [13] John Crinnion: Evolutionary Systems Development, a practical guide to the use of prototyping within a

structured systems methodology. Plenum Press, New York, 1991. Page 18.

- [14] S. P. Overmyer: Revolutionary vs. Evolutionary Rapid Prototyping: Balancing Software Productivity and HCI Design Concerns. Center of Excellence in Command, Control, Communications and Intelligence (C3I), George Mason University, 4400 University Drive, Fairfax, Virginia.
- [15] Davis. Page 72-73. Citing: E. Bersoff and A. Davis, Impacts of Life Cycle Models of Software Configuration Management. Comm. ACM, Aug. 1991, pp. 104-118.
- [16] Software Life-cycles, Peter, wittmannclan.com, 2005-2008, 12th December 2008, <www.wittmannclan.de/ptr/cs/slcycles.html>
- [17] Lembaga Akreditasi Negara, "Laporan Penilaian Panel Penilai (Pra Lawatan), Kelulusan Perakuan Akreditasi Kursus Pengajian, (A5621)", Bachelor of Information Technology (Hons) Information and Communication Technology, Universiti Teknologi Petronas (UTP), 1997, 23 October 2007.
- [18] PHP/MySQL Tutorial, 10th January 2009, <www.OnlyScript.biz, www.FastTreck.info>
- [19] J. Holck and T. Clemmensen, "What makes web development different", Ulvik, Hardanger, Norway, 2002.