

Course Recommendation Application for Admission to University

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ABSTRACT

Studying in Higher Education institutions has been the dream of many students who completed their post-secondary schools. This study aims to assist the students in their decision for admission to the program courses offered at Universiti Kuala Lumpur (UniKL). A wide variety of technical program courses are offered on UniKL's twelve campuses. Every campus institute has specific specialisation program courses. Students who wished to study at UniKL usually would have to search for courses offered on various UniKL campuses. Usually, students could not decide which courses suited their personality and future career path. This study proposes a prototype application that assists and recommends the students with their course selection according to their personality and final examination results. The prototype would let the students take a personality test that allows them to understand their personality and proposes a list of UniKL courses that match their personality and examination results. Therefore, the students would have a clear view of the prospective opportunities the program courses have to offer and the direction of their future careers. The career prediction recommendation would let the students target suitable courses that match their examination results and personality.

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1. Introduction

The students who have completed high school usually plan to further studies in Higher Education Institutions (HEI). Various Higher Education institutions in Malaysia offer many courses in diverse specialisation areas. Currently, student who just finished school often faces the dilemma of choosing suitable courses that suit their ambition. Another factor is that the students wonder if the examination results could fit the course's studies requirement.

This study focuses on students' course admission to Universiti Kuala Lumpur (UniKL). UniKL is one of the private Higher Education Institutions in Malaysia that offers many courses on various campuses nationwide. Currently, thirteen UniKL campuses conduct technology engineering specialisation with various distinct courses. However, students who wished to study at UniKL would go to the UniKL website's respective campuses to browse the courses offered.

This study proposed an admission course prototype that allows students to view better UniKL offered courses. The prototype also would predict and recommend suitable courses according to the student's personality and examination results. Although a study on enrolment influencing factors in UniKL has been conducted by Abu Haris et al., (2016), the study does not go in-depth about admission to identify which courses in any UniKL campuses are suitable for enrolment concerning the national examination results.

2. Malaysia Education System

Universities or HEI are essential in developing human capital through learning, reflecting and engaging people (Ehlers & Schneckenberg, 2010). The demand for higher education engagement in Malaysia and the rising

cost of overseas education has transformed Malaysian HEI into the regional centre of educational excellence. This transformation led the Malaysian government to restructure its higher education sector in the mid-1990s by allowing private universities to be established besides public universities (Mei, 2002).

The Malaysian education system is based on the Razak Report developed in 1956 (Yahaya, 2003). The report was named according to Malaysia's late second prime minister Tun Abdul Razak, the head committee that established the education system. The education system was proposed to preserve the need to maintain a harmonious relationship between various races in Malaysia. The suggestions in the report included implementing the Malay and English language as compulsory subjects for primary and secondary schools and achieving standardised examinations for students in all schools (Yahaya, 2003), (Alfan & Othman, 2005).

The Malaysian national education system is divided into four levels which are preschool, primary, secondary, and post-secondary education levels (Education System, 2019). The preschool is for students aged four to six years. The primary level of education is divided into national schools and national-type schools. The Malaysian secondary school education level consists of three types of schools: Academic, Religious National, and Technical and Vocational. The difference between these schools is based on the subjects offered as follows (Alfan & Othman, 2005):

- 1) Academic schools - offer the subject for art and science streams plus additional vocational and technical subjects, which are parts of the school's curriculum.
- 2) Religious National schools - offer compulsory subjects on Islamic teachings and, at the same time, offer general academic subjects.
- 3) Technical and Vocational schools - offer vocational and technical subjects plus subjects related to general education.

The students who study in these schools are required to sit for the national examination in which the academic schools and the religious school students are required to sit for the Malaysia Certificate of Education (SPM), and the technical schools are required to sit for Malaysia Certificate of Education for Vocational (SPVM). These examinations are vital in the Malaysian education system in preparation for the post-secondary level.

The post-secondary level is essential for students who wish to further studies in HEI because the entry requirement is based on the student's national examination achievement. The post-secondary level consists of four programs: matriculation, Malaysian Higher School Certificate (STPM), a certificate program in vocational fields area and a Diploma program. Thus, students intending to further studies in Malaysian HEI could enrol in private or public HEI, which offers nationwide courses. However, getting admitted to public HEI for certain groups of students is quite complex and challenging (Chang Da, 2007).

Students usually enrolled to study in HEI have a high expectation that further education would improve their job prospects through the academic knowledge and experience gained (Fernandez, 2010). The study conducted by Mehboob et al. 2012, believed that the student who has the intention to study in HEI is influenced by three significant factors, which are Internal factors (Aspiration, Aptitude, and Career), External factors (courses, cost location, reputation, promotion, and facilities) and social factors (parents, friends, and teachers). Another factor that the student's further studies in HEI is because of the employment opportunities upon study completion (Klauauw, 2002).

Currently, there is also research that students looking or searching for personalised courses (Bendakir & Aimeur, 2006), (Sobecki & Tomczak, 2010), (Bydzovska, 2013). HEI also offers specialisation courses often recommended for students with good examination results (Vialardi et al., 2011). A few HEIs also offer elective courses for students who wish to get additional knowledge and enhance their skills besides the core program courses (Mahony & Smyth, 2007).

3. Course Recommender System

Recommender Systems (RS) represent software tools and techniques to suggest items to users based on their preferences for the decision-making process (Rokach et al., 2011). Educational Recommender System (ERS) shares similar objectives as e-commerce RS (Santos & Boticario, 2010). RS involves three types of data: social, individual, and content (Burke et al., 2011). RS could also be implemented to assist students in selecting courses, subjects, and educational content (Manouselis et al., 2012). Other types of RS or applications in the educational field are as follows:

- ALPRS- an adaptive learning path recommendation system that provides learning direction through learning styles (Su, 2017).
- Personalised recommendations based on the learning outcome assist universities in managing and controlling student learning (Jiang et al., 2014).

- Educational Advisor System - a system advising students with university regulations during their studies (Goodarzi & Rafe, 2012).
- Learning Support Framework - The functionalities involve course selection, class recommendation, visualisation of research work progress, identifying student interest tendencies and research work interruptions for graduate students (Seo & Ochimizu, 2012).
- Course Agent - Course recommendation for graduate students. Assessments on course relevancy towards their career goals (Farzan & Brusilovsky, 2006).
- TORMES - support educators in recommending learning contents or technology to learners (Santos & Boticario, 2010).
- Course recommendation - Course recommendation for students based on preferences, skills, behaviours, and High school Grade Point Average (GPA) using clustering and fuzzy association rules (Asadi et al., 2019).
- Courses recommendation based on learner profiles in Moodle using the K Means algorithm (Rawat & Dwivedi, 2017) and Apriori algorithm (Aher & Lobo, 2011).
- Learning resources and peers' recommendations using the K Means and Apriori algorithm (Zheng et al., 2016).
- GMS - a Grading Management System in which the system predicts future learning plans on the course module (Thanh-Nhan et al., 2016).
- RARE - a Course Recommendation using Association Rule in which former students' opinion is used to rate the course selection (Bendakir & Aimeur, 2006).
- MOOC learners - RS suggested a Leader Learner support At-risk and Struggling learners to understand the knowledge using MOOC (Bouzayane & Saad, 2018).
- Courses recommendations according to students' grades using clustering based on similarity (Mondal et al., 2020), k-nearest neighbours collaborative filtering (Thanh-Nhan et al., 2016) and fuzzy logic (Sulaiman et al., 2020).

Many researchers, as discussed, believe that a course recommendation system is essential for suggesting students' suitable courses for tertiary study. This research is focusing school students identifying suitable courses to further study in HEI. Other factors to consider, usually the implementation of these RS, are accompanied by technologies such as digital learning resources (Yu et al., 2016) and social networking (Ding et al., 2015).

3.1 Higher Education Institution Admission Requirement

Admission to HEI in Malaysia requires students to sit for Malaysian national examinations such as the Malaysian Certificate of Education (SPM) or A-level. Students who receive the SPM result in a few months could opt for further studies either to take a pre-university program (STPM, Foundation program, and Matriculation program), Diploma program courses, or Certificate or Skills training program. The admission flow structure process to further study in HEI is shown in Figure 1.

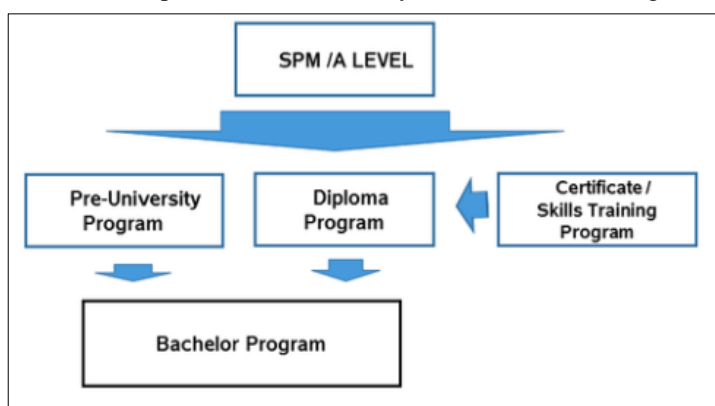


Figure 1. Admission Flow to HEI in Malaysia

Besides public and private HEI, students could also opt to study in Polytechnics in Malaysia. Polytechnics is another type of HEI in Malaysia that offers technical skills courses. Students wishing to become semi-professionals in engineering, commerce, and hospitality could enrol in Polytechnics. Polytechnics usually offer Diploma or Certification program courses, and upon completion of studies, the students could apply to further study in the HEI.

3.2 Admission to Universiti Kuala Lumpur

Currently, there is an online admission application form on the website of every UniKL campus that allows students to pre-enrol for suitable courses. Students who wished to enrol for their studies in UniKL would require browsing every UniKL campus to identify courses that match their personality and examination results. Once this student identifies the right course according to their interest and examination results, they could enrol using an application form through the UniKL website or visit the UniKL campuses. The admission process flow using the UniKL website is shown in Figure 2.

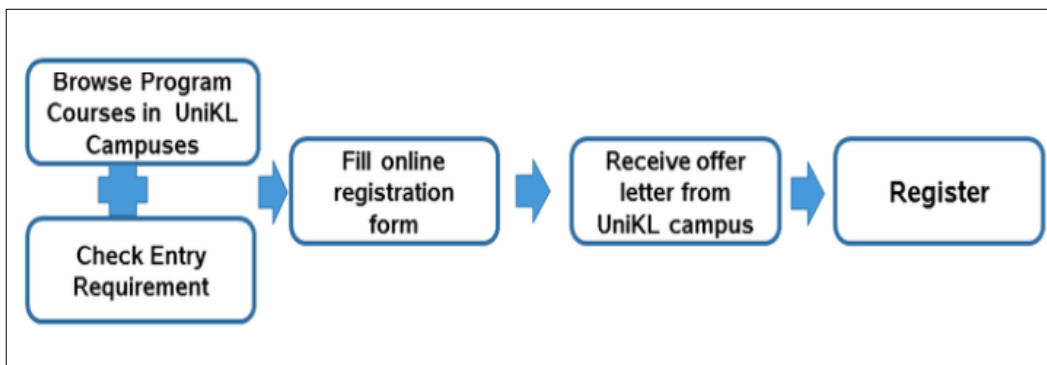


Figure 2. Admission Flow to UniKL

The student must fill up personal information, preferred courses, and academic qualification with the latest examination results, either SPM, STPM, or Diploma. The process flow to apply for course admission is shown in Figure 3. Subsequently, UniKL would process the student application and send a letter of enrolment offer during registration day, according to the respective UniKL campus.

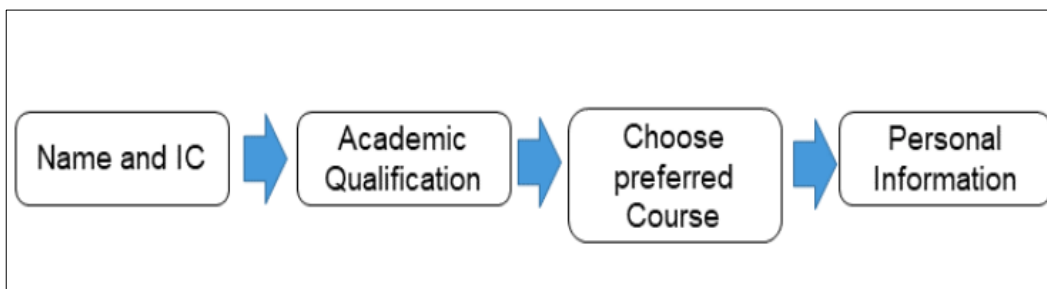


Figure 3. Online Admission Application UniKL

4. UniKL Course Admission System Prototype

The UniKL Course Admission System (CAS) prototype would propose the students' personalised prediction and recommendation according to personality tests and examination results. The CAS prototype has a personality test feature that would display the prediction result about the student's character personality suitability to the specific career path. The examination result feature would propose recommendations on specific UniKL courses that match the student's examination results strengths. The CAS system prototype features process flow is shown in Figure 4.

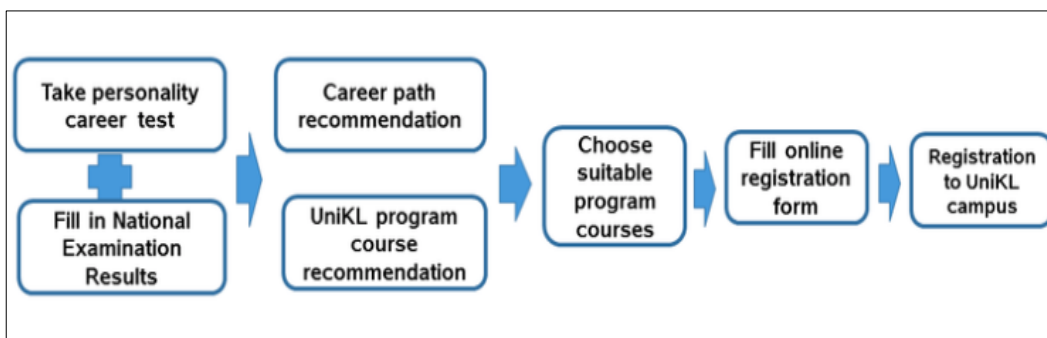


Figure 4. Course Admission System Prototype Architecture

The UniKL CAS prototype developed in this study has three main functionalities features. The features are as follows:

- Personality test - the student must take the Myers-Briggs personality test to identify which career suits their personality. The CAS prototype will suggest which UniKL campus has courses that match their personality and career. The results would let the students make a better decision on the courses that would lead them to choose the right career path.
- Examination result - the student must fill in their latest examination results, either SPM, STPM, A-level, or Diploma. The CAS prototype will process the examination results information. The CAS prototype would suggest a UniKL campus that matches courses suitable to their examination results. Therefore, the students could also identify that their examination results strength is most suitable to which courses are offered in UniKL.
- General feature - students can display an overall view of all UniKL campus courses related to examination results, either SPM, STPM, A-level, or Diploma. Then, the student can choose a maximum of three UniKL courses and compare the information available for each course.

Thus, the CAS system prototype could benefit students in searching for the preferred UniKL course according to their choice. Therefore, the students would have a better view of the courses suitable for their examination results. Thus, the students could make better decisions to enrol in any UniKL course, as shown in Figure 5.

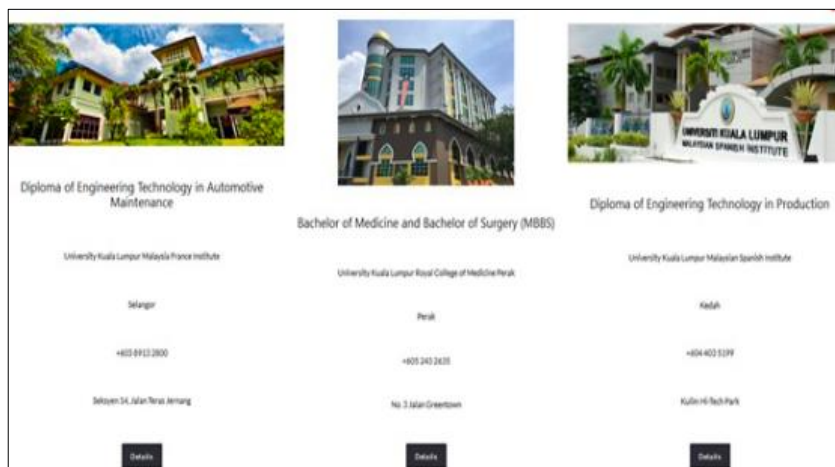


Figure 5. Comparison Course According to Examination Results

The CAS prototype also allowed the students to compare courses from various UniKL campuses, as shown in Figure 6. The CAS system also allowed the students to decide or accept the course recommendation or to change the proposed recommendation.

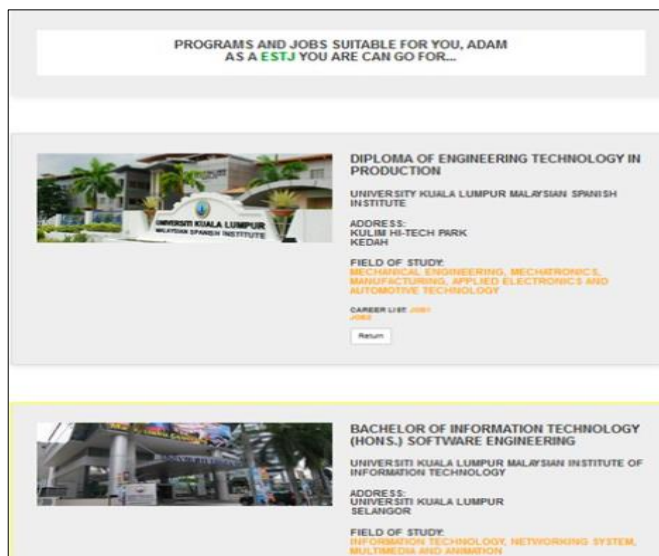


Figure 6. Comparison Course According to Personalities

Besides the suggested courses, once the student has decided on the preferred UniKL course, they can register online at the respective UniKL campus website.

5. Conclusion

This study focuses on finding the solution to the student's dilemma in finding suitable courses in UniKL. Any UniKL prospective students could use the CAS prototype to identify the program course information that would lead them to their dream career path because they know the program's suitability to their personality and career path direction. Thus, the students would benefit from the CAS system prototype recommendation in building their confidence to study at UniKL and develop a better perspective of their academic abilities to complete the suggested course within the stipulated time.

UniKL could also utilise the CAS prototype in collecting relevant data to identify the most popular courses. Besides, UniKL could also benefit from the CAS prototype to market its program courses to broader Malaysian students nationwide. Therefore, in the long run, UniKL could become one of the most popular education service providers in promoting their courses to potential UniKL students.

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