

Grade-point-average-based Scheme for Tracking Academic Students' Performance at King Fahd University of Petroleum and Minerals

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SUMMARY A presentation of a grade-point-average-based scheme for tracking academic performance of students at King Fahd University of Petroleum and Minerals (KFUPM) is given. The application of such a scheme to students at KFUPM with promotional grade point averages (1.000–1.600) from the Preparatory Year Programme to college is presented. The case-study included tracking the academic performance of 916 students admitted to KFUPM between 1984 and 1989.

1. Introduction

King Fahd University of Petroleum and Minerals in Dhahran, Saudi Arabia is a major engineering school in the region. Since its foundation in 1964, the university introduced a one-year programme (two semesters) as the Preparatory Year Programme (PYP) for the majority of high school students newly admitted to the university. The students take fundamental courses in mathematics, basic sciences, English and skill-oriented technical courses. The courses taken in PYP have been subjected to periodic revisions. Table I, which is taken from ref [1], shows the phases of development of PYP since 1974. The main objectives of the programme [2] are as follows: (1) the enhancement of students' proficiency in the English language in order that they may undertake college studies in which English is the principal language of instruction; (2) to acquaint students with the use of English in the study of fundamental concepts in science and mathematics.

Students who successfully finish the programme are admitted to a four-year college programme. Various criteria for promoting students to college courses have been tried over the years. The criteria were modified in keeping with the spirit of changing circumstances. It is not the intention here to detail the promotion criteria. However, the present promotion criteria indicate that, as a minimum requirement, students can be promoted to college courses after one year in PYP if they get grades of 'C' and 'D' in English and mathematics in two semesters, no matter what grades they get in other courses. This has resulted in promoting students with grade point averages (GPAs) less than 2.00 which, if obtained in college, would place them in scholastic probation. Furthermore, some students who fail to get promoted in one year, are normally given more time in PYP to pass English and/or mathematics, this being an uncertain investment by the university in such group of students. The present criteria have been in effect since the autumn of 1985.

The objectives of this article are twofold:

- (1) the presentation of a scheme for assessing the academic performance of any specific group of students in college studies based on some pre-defined criteria—such a scheme may be applied to schools that have similar academic systems to that of KFUPM;
- (2) the application of the scheme to assess the performance of KFUPM students who were promoted from PYP to college courses with GPAs less than 2.00.

2. Scheme Description

2.1 Selection of Target Group

Students' performance and retention have been the subject of many investigations in the past (see, for example, refs [3–11]). Different aspects of college education have been addressed, which included factors affecting retention, drop-out and prompt completion of college education. These factors include living and social circumstances, cultural background, academic background, work habits, motivation, attention to work, race, sex, etc. Because of the large number of these factors, prediction of students' performance in view of these factors is a very difficult task. In order to study the effect of any single factor on the performance of a group of students, target students must share similar circumstances with respect to other possible factors. This is a difficult situation to bring about. However, the closer the students' circumstances, the more meaningful a study would be.

TABLE I. Development of the preparatory year programme courses.

Phase (years)	Course number	Subject	Credit*
I (1974–1977)	ENGL 001, 002	Preparatory English I, II	16 SCH/week
	MATH 001, 002	Preparatory Math I, II	3 SCH/week
	SE 001, 002	Introduction to Engineering I, II	3 SCH/week
	CE 001, 002	Civil Engineering (Graphics) I, II	2 SCH/week
	ME 001, 002	Mechanical Engineering Shop	1 SCH/week
	CHEM 001, 002	Preparatory Chemistry I, II	1 SCH/week
	PHYS 001, 002	Preparatory Physics I, II	1 SCH/week
	PE 001, 002	Physical Education I, II	3 SCH/week
II (1977–1981)	ENGL 001, 002	Preparatory English I, II	8 total credits
	MATH 001, 002	Preparatory Math I, II	6 total credits
	ME 001, 002	Preparatory Shop I, II	1 total credits
	PE 001, 002	Physical Education I, II	1 total credits
	SE 001, 002	Computations in Science and Engineering I, II	4 total credits
III (1981–1985)	ENGL 001, 002	Preparatory English I, II	14 total credits
	MATH 001, 002	Preparatory Math I, II	6 total credits
	ME 001, 002	Preparatory Shop I, II	2 total credits
	PE 001, 002	Physical Education I, II	2 total credits
	SE 001, 002	Computations in Science and Engineering I, II	4 total credits
IV (1985–1988)	ENGL 001, 002	Preparatory English I, II	16 total credits
	MATH 001, 002	Preparatory Math I, II	8 total credits
	ME 001, 002	Preparatory Shop I, II	2 total credits
	PE 001, 002	Physical Education I, II	2 total credits

*SCH=semester credit hours.

At KFUPM, a unique situation exists whereby students are all on government scholarships and all live on campus, thus sharing similar living circumstances. Cultural and academic backgrounds, for most students, are similar in the sense that a large portion of students come from The Kingdom of Saudi Arabia and the neighbouring countries. All the students are male. Racial variations are minimal. The uniformity in these aspects undoubtedly clears the way to identify factors that may bear a crucial relevance to the performance and retention of students in college.

Therefore, at KFUPM personal factors, such as work habits, motivation and attention to work seem to play a key role in the prediction of students' performance. These factors are directly reflected in the scholastic GPA of the students. We have selected the promotional GPA from PYP to college, for students who had the same courses in PYP, as the criterion for identifying the target group of students.

2.2 Data Collection

Once the target group of students has been identified, their status in college is recorded at the end of each semester. Fig. 1 shows the sheet for the collection of data. Five categories have been used to describe the status of the students. The number of students in each category at the end of each semester of their attendance at the college is entered in the allocated space. For example, if a student is in a good standing at the end of his first semester in college, then an entry will be made under 'Good Standing' in the first semester. In this way, a student will have one status entry per semester. The five categories—'Probation', 'Dismissed', 'Withdrawn', 'Good Standing' and 'Graduated'—reflect the full spectrum of students' status. The data sheet can be used to track the status of students who were admitted to college in a specific year, or may

		Promotional GPA From 1.XXX To 1.XXX					Number of terms spent in prep. X				
College semester		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Status											
NUMBER OF STUDENTS	Probation										
	Dismissed										
	Withdrew										
	Good standing										
	Graduated										
	Total										

FIG. 1. Data sheet for tracking the status of students.

be used to track the status of students who were admitted to college over a number of years. The fact that the latter case includes more students, means that reliability in the information about group attitude is certainly expected to be enhanced. The number of students in each category is obtained from transcripts of target students. After all the data are filled in the appropriate spaces, the numbers are converted to percentages based on the total number of students that appear in the bottom of each column in the data sheet. The process of tracking students' transcripts is carried out manually.

3. KFUPM Case Study

3.1 Objective

Over the past few years it was felt that a significant number of promoted students with promotional GPAs less than 2.00 face academic difficulties in their college studies. This was reflected in the increased cases of scholastic probation in college-level courses. To assess the academic performance of these students in college, a study was carried out on 916 students, these being all the students promoted from PYP to college with GPAs between 1.000 and 1.600, and who had been admitted to the university between the autumn of 1984 and the autumn of 1989.

3.2 Categorization of Students

The range of GPA was divided into four subranges as depicted in Table II.

Students in each GPA subrange were categorized based on the number of terms spent in the PYP. The schematic categorization of students included in this study is shown in Fig. 2. The word 'Term' in Fig. 2 means semester, in which the minimum course load is 12 credit-hours, and/or summer course, in which the maximum course load is 8 credit hours. The progress of students in college was monitored by tracking

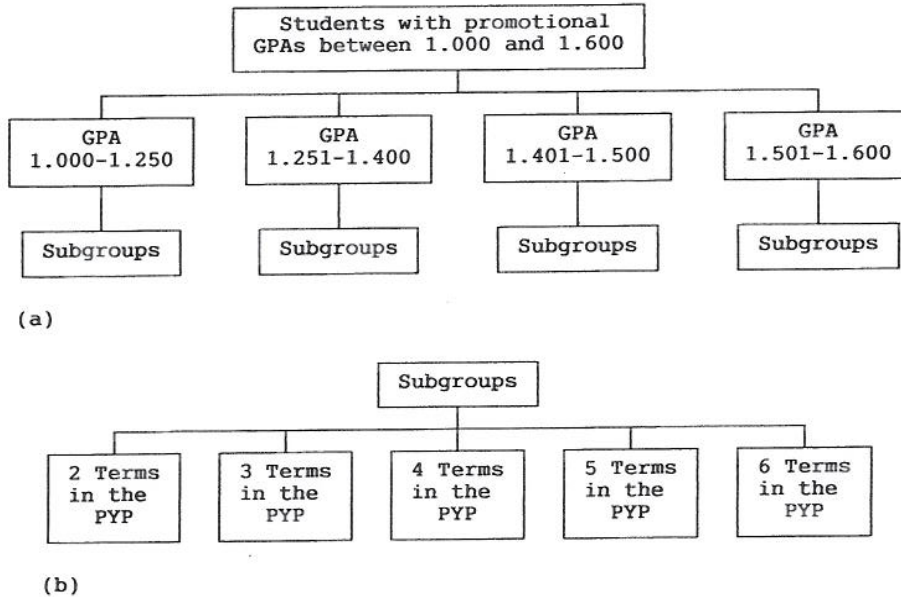


FIG. 2. Categorizing scheme included in the study.

TABLE II. Range of promotional GPA in the study

Range	GPA
1	1.000-1.250
2	1.251-1.400
3	1.401-1.500
4	1.501-1.600

their status at the end of each semester of their stay in college, following the procedure outlined in Section 2.2. Any regular semester in which less than 12 credit-hours were taken was discounted from the tracking process since regulations at KFUPM prohibit students, in normal circumstances, from taking less than 12 credit-hours. Summer performance in college was also discounted from the tracking process for the reason that summer results do not alter the academic standing of students. For instance, scholastic-probation status cannot be changed based on summer grades.

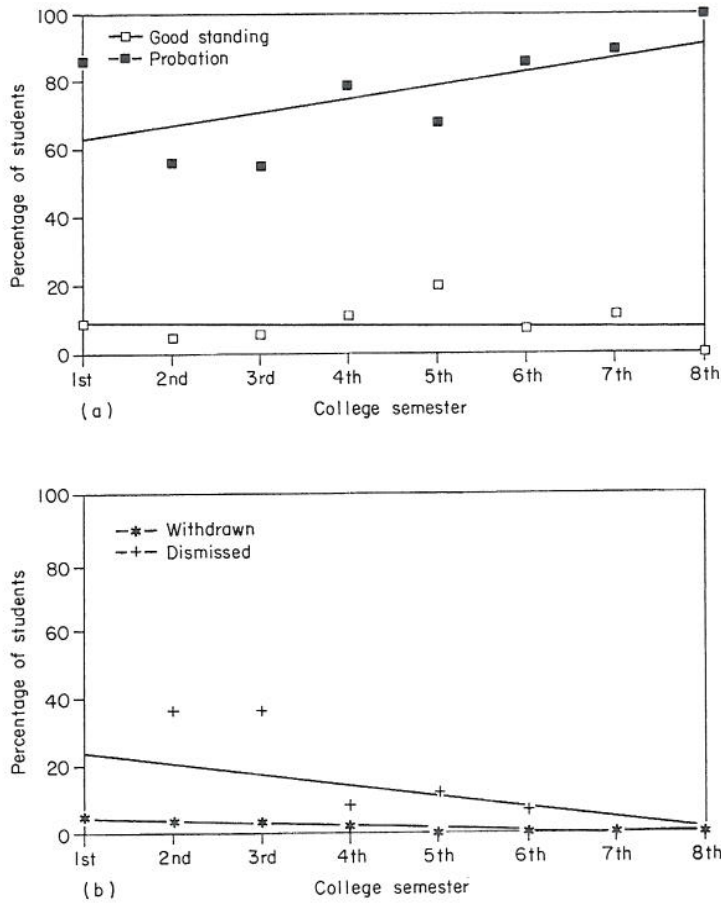


FIG. 3. Performance of students in college promoted with GPA in the range 1.000-1.250.

3.3 Analysis and Discussion

3.3.1 Promotional GPAs Between 1.000 and 1.250. Fig. 3 shows the time history of the status of all the students (203 students) in this category. The straight lines were established using the least-squares method and show the trend in the data points. It is clear that probation for the students in this category tends to increase with time, and the percentage of those in probation at any time is always more than 50%. The upward trend shows that probation tends to worsen with time. Unlike probation, the good standing attitude shows a level trend, where the percentage of students in good standing maintains a level of around 10%. Dismissal and withdrawal rates tend to go down with time. No student was able to graduate in eight semesters.

The performance of the subgroups in this category of GPA, portrayed in the same way as that of Fig. 3, showed similar trends in probation, good standing, withdrawal and dismissal rates. A typical example is given in Fig. 4, in which the performance of the subgroup who spent four terms in the PYP is shown. This shows that the period spent in the PYP does not have a pronounced effect on the general performance of the students portrayed in Fig. 4.

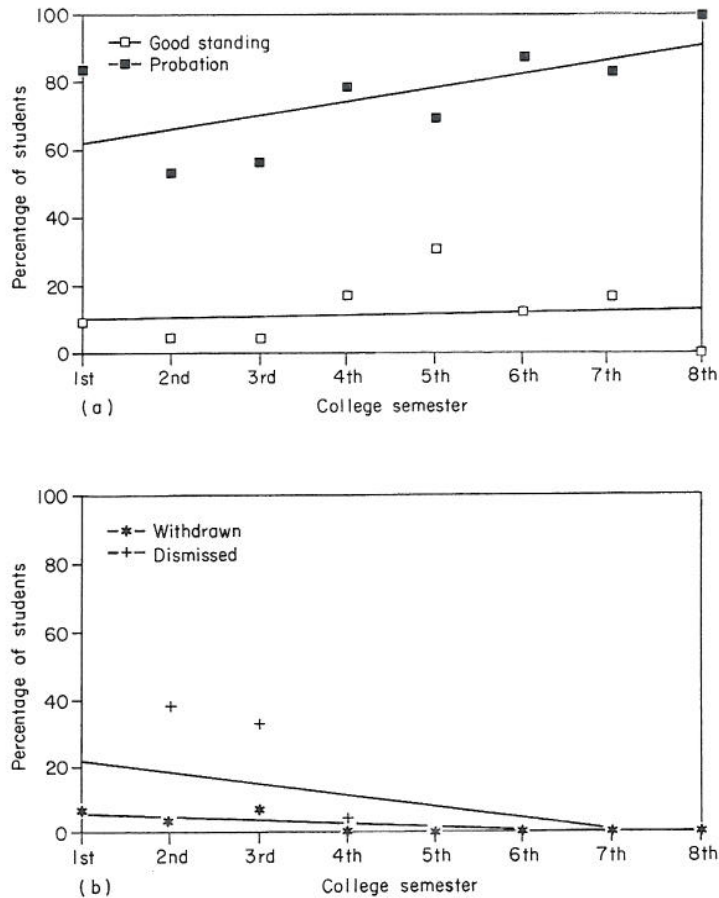


FIG. 4. Performance of students in college who spent four terms in PYP and were promoted with GPAs in the range 1.000–1.250.

3.3.2 *Promotional GPAs Between 1.251 and 1.400.* The trend analyses performed on the whole population (301 students) in this category of GPA (Fig. 5) show a slight improvement in probation and good standing rates over those in the previous category of GPA, where a slight decline in the probation and an upward increase in the good standing rates are observed. Such trends were observed in the trend analyses for the subgroups who spent three and four terms in the PYP. However, the trends in probation and good standing for the subgroups who spent five and six terms in the PYP showed similar behaviour to those in the previous category of GPA. The number of students who spent five and six terms in the PYP forms only 14.6% of the total population in this category of GPA. The observation here is that as students spend more than four terms in the PYP in order to pass English and/or mathematics, that extra time does not seem to help them in college.

It was observed also that, for all the students in this category of GPA, only 4.17% of those who reached the eighth semester were able to graduate.

3.3.3 *Promotional GPA of 1.401–1.500 and 1.501–1.600.* The performance of students in these two categories of GPA showed very similar trend in their scholastic probation, good standing, dismissal and withdrawal behaviour. As a representative case for the

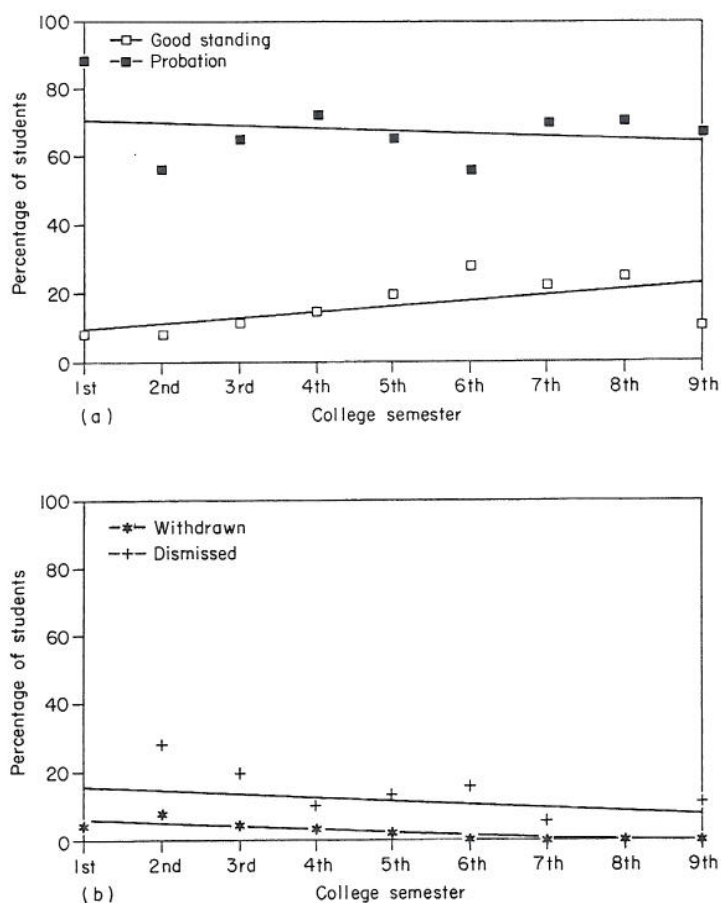


FIG. 5. Performance of students in college promoted with GPAs in the range 1.251–1.400.

two GPA categories, Fig. 6 shows the performance of all students with promotional GPA of 1.401–1.500. The performance here shows a notable relative improvement over the previous students (in Sections 3.3.1 and 3.3.2) in scholastic probation and good standing rates. The trends show a notable decline in probation rate while at the same time showing an incline of similar steepness in the good standing rate.

The students who spent three terms in the PYP gave the best performance for the two GPA ranges. These students form 58.4% of the population (227 students) in the GPA range 1.401–1.500, and 57.1% of the population (185 students) in the GPA range 1.501–1.600. For those who spent more than three terms in the PYP, the extra time given to them in the PYP did not seem to help them in college studies.

4. Conclusions

The preceding sections of this paper underline the importance of tracking the performance of a certain group of students based on their promotional GPAs from PYP to college. The methodology of the tracking process enables one to monitor closely the progress of students in college studies. The presentation of results enables one to study the trends in 'Probation', 'Good Standing', 'Dismissal', 'Withdrawal' and

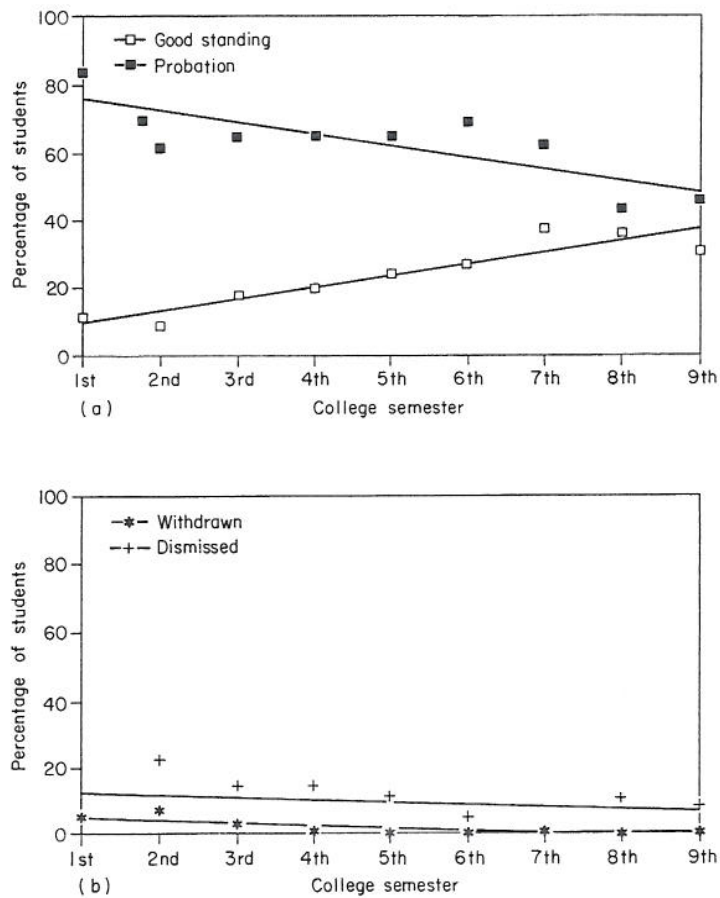


FIG. 6. Performance of students in college promoted with GPAs in the range 1.400–1.500.

'Graduation' status on any specified group of students. This in our opinion could serve the following purposes:

- (i) the projection of academic performance on more scientific grounds;
- (ii) the formation of an important source of input to the policy decision makers when deciding on minimum acceptable GPAs for entry to college;
- (iii) the early observation of signs of academic problems.

The systematic recording of students' progress according to this scheme, which was carried out manually for the KFUPM case-study, could be extended to include automatic means for recording. This, undoubtedly, will serve the above three points more efficiently.

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