A Four-Year Foundation/Accelerated Degree Programme. Do We Really Need It?

Paul Molefe, and Buyisiwe M. Sondezi

Abstract—It has been recognized that knowledge and innovation are critical contributors to national economic prosperity and welfare. As a result, undergraduate education has assumed greater significance within the higher education system to increase the enrolment of postgraduate studies. However, the status quo remains, as the country still suffers from an acute shortage of trained personnel in science-related fields notwithstanding difficulties experienced by students coming from disadvantaged backgrounds. The high failure rate in university first year has placed universities under considerable pressure to in particular adapt undergraduate science curricula in order to provide students with adequate foundation required to navigate the first year curricula. As a consequence of this dilemma, the duration of the three-year undergraduate science programmes at the University of Johannesburg (UJ) were elevated to four years in order to make provision for additional tuition. This study examines the impact of an additional year in the undergraduate curriculum. To establish the impact of this option, the comparative analysis of the performance of students from the four-year foundation program and their counterparts in the three-year mainstream curricula was performed.

Keywords—Extended degree, Mainstream degree, Physics foundation programme.

I. INTRODUCTION

The youth participation in science, engineering and technology (SET) degree(s) is imperative to the economy of the country. The high participation in these degrees has assumed greater significance within the higher education system to increase the graduation rate and postgraduate enrolment. Within a South African context, providing access to higher education is regarded as a strategic priority in the National Higher Education Policy. The Council of Higher Education states the following vision for equity and redress: “To promote equity of access and fair chances of success to all who are seeking to realize their potential through Higher Education, while eradicating all forms of unfair discrimination and advancing redress for the past inequalities” (CHE, 2002).

The participation rate in South Africa has increased from 15% in 2000 to 18% in 2010. The steady increase suggests that access to Higher Education Institution (HEI) is growing. Despite the growth, it is clear that most students do not pass their first year level modules. As a result there is high dropout from these degrees and this explains high shortage of skills in SET degrees. Noticeable, most students enrolled for three year degree do not complete their first year level physics module. As the results of this observation, University of Johannesburg (UJ) has embarked on introducing a four-year degree programme degree to deal with high failure rate. Students enrol for three year degree if achieved an Admission Point Scores (APS) of plus 60% and 50% - 59% for four-year foundation in their National Senior Certificate (NSC) in physical science.

The four-year foundation degree programme was introduced in 2008 and students were doing their first year modules in two year with mechanics in their first year and electromagnetism in second year. Since 2011 the programme has been changed to a new format called accelerated programme. This programme allows this group of students to join their mainstream counterparts in the second semester of their second year. It must be emphasised that this happens semester earlier than the initial foundation programme. This format enables four-year programme (accelerated programme) students to study electromagnetism with mainstream programme students in the same class. The aim of this study is to investigate if this group of students from the accelerated programme can increase the number of third year students with a possibility of enrolling for honours degree. The objectives of this study are:

A. Definition of terms

Semester Mark: Contribution of all the assessment marks obtained by a student in one semester. This mark is comprised of all assessments undertaken in a semester, that is, the combination of class tests, tutorial tests, home-works and practical mark.

Average Module Mark: Final mark obtained after the contribution of the semester mark and the exam mark.

Module Pass Rate: This is the percentage obtained by considering the number of students who participated in a given examination. The total number of students passing the exam over the number of students allowed to write the exam gives a pass rate of that particular group.
Throughput: This is the percentage of the number of students who passed the module over the total number of students who enrolled for the course at the beginning of the year.

II. METHODOLOGY

The data used in this study was collected from class performance results for both the accelerated and mainstream programmes. These groups of students were enrolled in the same classes (PHY1B, 2A, 2B and 3A) in 2012, 2013 and 2014 respectively.

A. Data collection

The data of the two groups were compared in the respective modules and years. From the PHY3A (2014), the accelerated programme students were isolated with the aim of observing the groups marks distribution. The past three years PHY3A numbers were compared with the current cohort.

B. Modules

The physics modules at UJ from first to third year physics are outlined in table 1. There were 452 students enrolled for four-year accelerated degree in 2011 and 417 enrolled for three year mainstream physics.

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Module</td>
<td>PHY1AP</td>
<td>PHY1AMN</td>
<td>PHY1BAP</td>
<td>PHY1AMN</td>
</tr>
<tr>
<td>Number</td>
<td>452</td>
<td>417</td>
<td>208</td>
<td>78</td>
</tr>
</tbody>
</table>

Note: AP/FP = Accelerated programme, MN = Mainstream

The third year module had low number of students enrolled between 2011, 2012 and 2013, but it is noticed that in 2014 there was an improvement of 12 students enrolled. It is important to note that in 2012 and 2013 there were no students from AP. The reasons behind this non AP student’s enrolment were not part of this study. The 2011 and 2012 cohorts were chosen because of the introduction of accelerated programme. The AP accelerated degree was envisaged to increase the number of undergraduate and postgraduate enrolments in physics at UJ.

III. RESULTS AND DISCUSSION

Figure 1 represents the mark distribution of both four-year accelerated and three-year mainstream programmes. The two groups are comparable from the mark distributions and shows that the accelerated programme students are coping with their mainstream counterparts. There are some students from AP numbers above 400, studying mechanics and gradually reduced to 8 and 4 respectively in third year first semester module. Students from AP were considered to have a modest background in physical science, while students of MN were seen to be familiar with the subject. This conclusion was informed by their APS from their NSC.

<table>
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<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Module</td>
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<td>PHY1AMN</td>
<td>PHY1B</td>
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<tr>
<td>Number</td>
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<td>2</td>
<td>5</td>
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The AP accelerated degree was envisaged to increase the number of undergraduate and postgraduate enrolments in physics at UJ.

Figure 2 represent the throughputs of both AP and mainstream groups of students. The AP students seem to be achieving better than their counterparts from mainstream in all six categories. We noticed AP students obtained higher exam and module pass rates as compared to the mainstream students. This could be attributed to the extra semester spent in the mechanics 1 module for AP group. The throughput of AP is 20% higher than that of mainstream.
Figure 4 represents the throughputs of both semesters of second year physics modules. There is a good performance from both groups; it seems that in the first semester mainstream group of students were performing better than AP group. We notice a change in throughput in the second semester with AP group achieving throughput of more than 80%. The exam pass rate is not pleasing in both groups in the second semester. The reason behind that was not part of the study.

Figure 5 represents mark distribution of PHY3A module for both groups from semester 1. We noticed that both groups performed very well with the exception of two students from AP achieving the distinctions. Is worth mentioning that both students’ exam marks had improved by 2-3% from the theory mark from the continual assessment. Both groups seem to have half the number achieving between 40 and 50%.

Figure 6 represents the throughput of both groups in physics third year module in the first semester. It is evident from the graph that both groups throughput are more than 60%. From the number of students that enrolled for PHY3A we notice that 8 out of 12 are from AP group. To get 5 out of 8 passing the module with two distinctions is noticeable achievement from the programme. It is of importance to mention that the intended programme is yielding the results of increasing the number of third year students and beyond.
IV. CONCLUSION

The central issue in this research was; can AP increase the number of third year students and beyond? It is evident that the students from AP can perform very well and even better than their counterparts from mainstream. It is worth noting that in the past three years the maximum number of students enrolled for physics major was five with two coming from extended degree programme. The results support that there should be an increase in the duration of contact in order to enhance the number of physics major students. The introduction of accelerated programme seems to have yielded positive results by increase a number of third years in PHY3A in 2014. The pass rate is pleasing with 67% of AP, 75% of MN and average of class as 67%.

ACKNOWLEDGMENTS

The authors acknowledge the assistance from the department of physics at UJ.

REFERENCES