# Is Foundation Provision the solution to first year students' performance?

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was still offered in the context of physics. The pace was retained to as slow as possible to allow simultaneous simulation of both mathematics and physics concepts.

*1.1. Definition of phrases and terms*

- **Semester Mark**: Contribution of all the assessment marks obtained by a students in one semester. This mark is comprised of all assessments undertaken in a semester, that is, the combination of class tests, tutorial tests, homeworks 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.

## 2. Methodology

The four year degree program at UJ sees the enrolment of various groupings of students; ranging from pure BSc. students, BIng. students and BOptom. students. The physics FPP for 2012 covered basic mathematics concepts in physics contexts, that is, straight line graphs whereby these were taught in the context of graphs of motion, position versus time graphs, velocity versus time graphs and other associated concepts. Basic trigonometry was used in the context of understanding vectors and forces. Students were taught the technique of resolving vectors from the understanding of trigonometric ratios. Continuous assessment was monitored as to establish their understanding and the build up towards the exam. Other topics covered in this module were motion in two dimension (building up from the understanding of one dimensions, linear graphs and related concepts); Newton's laws; including the proper drawing of free-body diagrams; work and energy and impulse and momentum, waves and sound. After the implentation of these inteventions in the four year degree program, a closer look at the performance of the students with the aim of assessing the program was undertaken. These observations of the students' performance in their first semester from 2010 to 2012 was looked at and the findings are listed in tables below.

## 3. Results

Table 1 contains the information regarding the overall picture of the students, from the students' intake into the module, the students allowed to write the exam, the module pass rate and throughput numbers of the module. The information as read from the table translates to the fact that 90%, 89% and 95% of the students qualified to write the exam in the year 2010, 2011 and 2012, respectively. It is important to mention that a student at UJ, requires only 40% of the theory mark and 50% of the practical mark to be allowed into the exam. Table 2 lists the outcomes of the students' marks outputs as analysed from the students progress from the time of enrolment to the final exam written. Despite the fact that almost equal percentage of students qualified to write an exam in 2010 and 2011 ($\approx 90\%$); we observe the difference in the exam pass rate (59% and 64% obtained in 2010 and 2011, respectively). This difference can be attributed to the both the content and duration of FPP (one term in 2010 and a semester in 2011). This therefore suggests that, time for simulating the content learnt is of utmost importance for the proper learning of the content. Although the exam pass rate of students in 2012 is even much

lower as compared to those obtained from two previous years, we still observe exactly the same through put (67%) as obtained in 2011.

**Table 1.** A table listing the statistics obtained from students' performance for three consecutive year, 2010, 2011 and 2012.

| | 2010 | 2011 | 2012 |
|---|---|---|---|
| Students in a module | 174 | 481 | 306 |
| Students admitted to the exam | 156 | 428 | 290 |
| Students refused admission to the exam | 18 | 53 | 16 |
| Students who attended exam | 155 | 418 | 269 |
| Number of absentees from exam | 1 | 10 | 21 |
| Students who passed exam | 92 | 268 | 139 |
| Students who passed the module | 108 | 324 | 205 |

**Table 2.** A table listing mark groupings of students' performances in the years 2010, 2011 and 2012; data represented in percentage.

| | Mark (%) | 2010 | 2011 | 2012 |
|---|---|---|---|---|
| 1 | Average semester mark | 57 | 54 | 59 |
| 2 | Average final exam mark | 52 | 54 | 50 |
| 3 | Exam pass rate | 59 | 64 | 52 |
| 4 | Average module mark | 52 | 50 | 52 |
| 5 | Module pass rate | 70 | 78 | 76 |
| 6 | Throughput | 62 | 67 | 67 |

This consistency in the throughput (in 2011 and 2012) is achieved from the observation that the average semester mark of the year 2012 is 59%; a bit higher than those obtained from the other two years whilst keeping the exam mark comparable with those in the previous years. It is rather important to note that the module pass rate is $\geq 70\%$ which is a good indication of the success of the program. The minimum of 70% obtained in 2010 as opposed to 78% and 76% obtained in 2011 and 2012, respectively, is achieved due to time spent in the program (term (2010) and semester (2011 and 2012)). The histogram in figure 1 graphically represents these data and it is clear that there is direct correlation between the duration of FPP and the performance of the students. The introduction of mathematical concepts within the physics context are presumed to be beneficial towards the understanding of the physics at this level. This is an indication that pure basic mathematics concepts are not a necessity in bringing the understanding of the physics, but a strategy in introducing the necessary tools to tackle physics related problems are important in giving necessary physics understanding. Despite the difference in the throughput and the module pass rate obtained in respective years, it is observed that the average final exam mark ($\approx 52\%$) and average module mark ($\approx 50\%$) are constant throughout this three year duration.

It is of ultimate importance to determine the distribution of the final performance of the students in these years. A mark distribution of the performances is listed in table 3 and graphically represented in the form of a histogram in figure 2. The disribution of 2010

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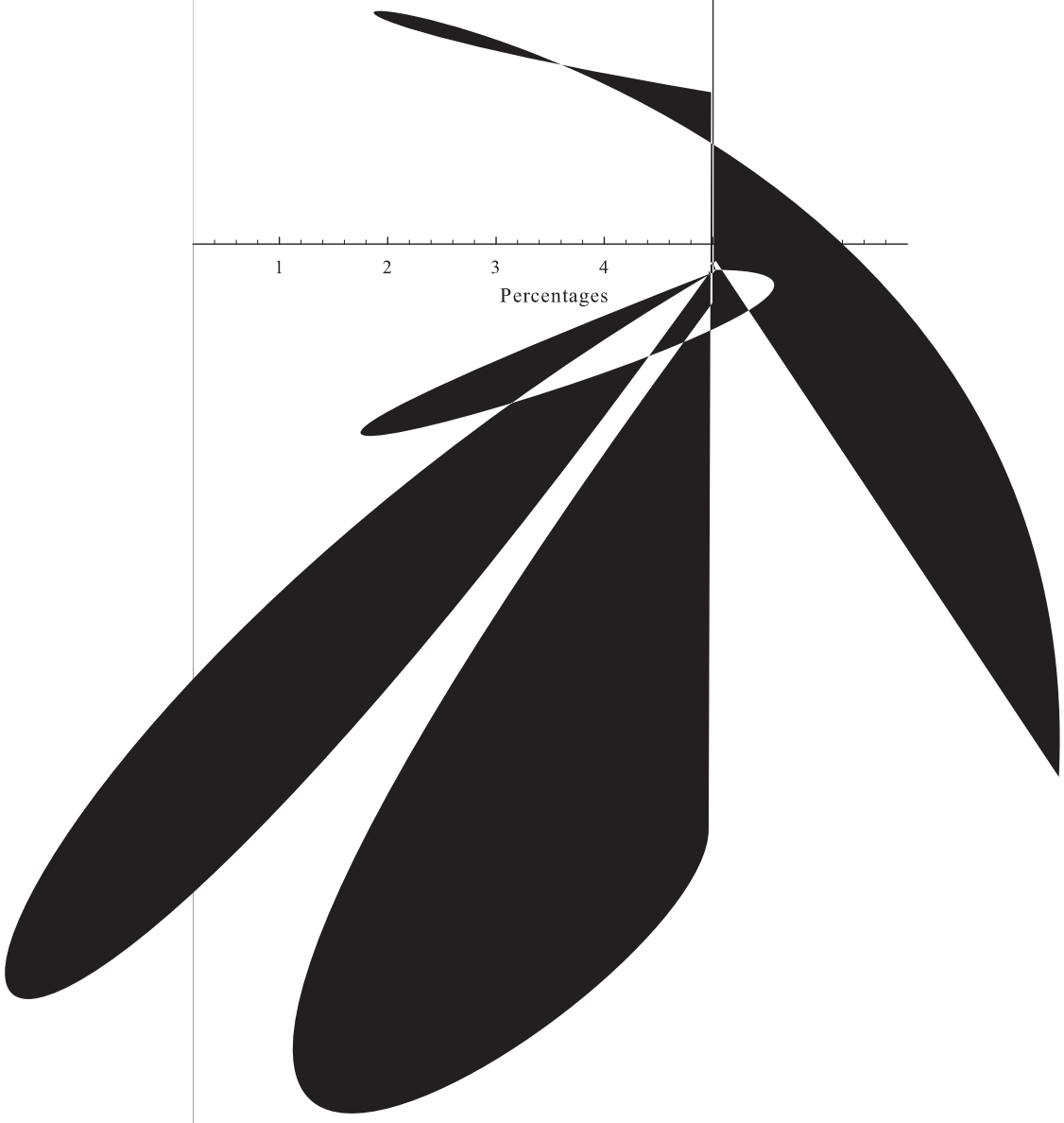


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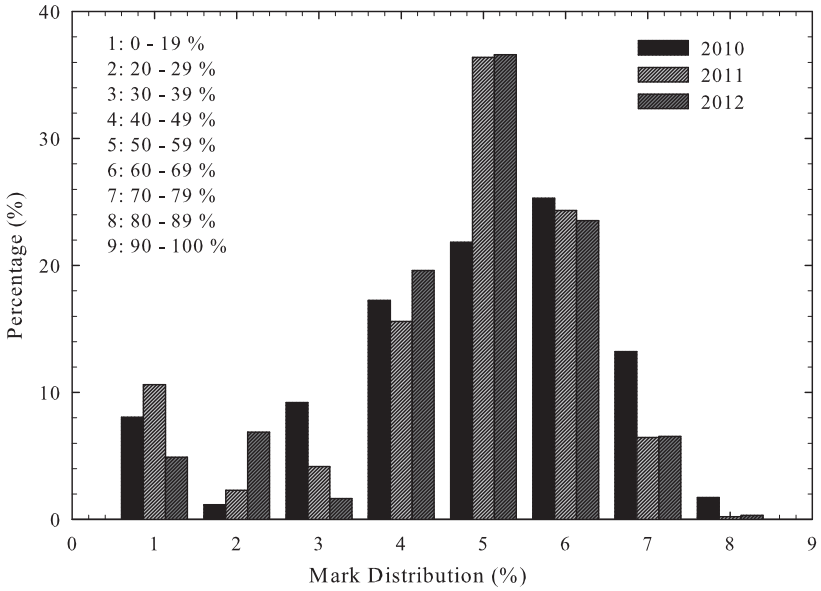


**Figure 2.** A figure representing students' marks distribution, for 2010, 2011 and 2012, respectively.

The similarity of such gave an understanding that the content of the FPP need not be pure mathematics, these skills can be taught and simulated within the context of physics. Proper emphasis of the use of these skills were observed to be crucial for the better understanding of the physics learnt in this module.