

The Correlation between Industrial Placements and Final Degree Results: A Study of Engineering Placement Students

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Abstract

This paper considers the view held amongst many work-based learning practitioners that students undertaking an industrial work placement, often graduate with a higher degree classification. Additionally, it scrutinises the assumption that placement students outperform their non-placement counterparts scholastically.

This paper builds upon results from more comprehensive longitudinal studies (e.g. Mandilaras (2004)). Through an institutional study of engineering undergraduates at the University of Leicester, it explores whether students that undertook an industrial work placement as part of their engineering degree, outperformed their non-placement counterparts.

The statistical analysis offers evidence that suggests a causal link between completing a placement and achieving higher academic performance in the final year of an engineering university degree.

Introduction

Whilst the correlation between placements and students' employability has been comprehensively explored by practitioners such as Bowes & Harvey (1999), Little & Harvey (2006) etc, there remains a dearth of current literature and research exploring the correlation between placements and final degree results.

Amongst the germane literature, research by Mayo & Jones (1985) and the Council for National Academic Awards (Davies, 2003) substantiate claims of correlation. Additionally, Mandilaras' (2004) comprehensive study of economics students at the University of Surrey provides further evidence that completing a placement significantly increases the chances of obtaining an upper second or higher degree class. Moreover, his work addresses variables that might otherwise undermine any assertions about such correlation. His work meticulously takes into account factors such as A-level subject choice/performance and nationality.

In exploring the possibility of correlation, this paper compares the final degree results of engineering placement students with that of their non-placement counterparts for three cohorts: engineering finalists of 2005, 2006 and 2007 at the University of Leicester. The analysis section discusses these results and the implications.

This paper takes into consideration the varied academic abilities of students based on 1st year degree results. Efforts were made to ensure the students sampled included those likely to get a

third, as well as those on target for an upper second (2:1) and a first degree classification, thus negating suggestions of skewed results or statistical bias.

Background: Engineering at the University of Leicester

The Department of Engineering at the University of Leicester is renowned for its research and academic excellence, having achieved a rating of 5A in the latest HEFCE Research Assessment Exercise. The department has roughly 240 undergraduate students, 80 taught postgraduate students, and 50 postgraduate and postdoctoral researchers. Its well-established industrial placement programme gives students the opportunity to embark upon a full year in industry within the following degree programmes:

- General Engineering
- Mechanical Engineering
- Electrical and Electronic Engineering
- Communications and Electronic Engineering
- Embedded Systems Engineering.

Past students have taken up industrial work placements with a host of blue-chip employers such as Toyota, Corus, Airbus, IBM and AstraZeneca.

Methodology

In attempting to assess whether the engineering industrial placement enhances students' academic performance, the research methodology selected was that of a comparative study. As such, this study scrutinised the academic performances of 80 engineering finalists (compared with the 124 economics students sampled in Mandailaras' study); 40 had undertaken an industrial work placement and the remaining 40 had not.

Mechanisms were put in place to provide optimum sampling and avoid skewed results or statistical bias. Firstly, whilst the selection of students (i.e. the 40 placement students and the 40 non-placement students) was random, the selection for each group was established from a pool of student sub-groups. The three sub-groups were categorised on the basis of students' academic attainment in the first year of their engineering degree. Hence, one sub-group consisted of students whose first year credit-weighted average mark equated to a third class degree (average <50%), whilst the other two sub-groups represented those achieving first year credit-weighted average marks of an upper second/2:1 (60% = average <69%) and a first class average mark (>=70%) respectively. Based on this spread of first year academic performance amongst the sample, one could reasonably argue that the binomial distribution of the sample was legitimate.

The second provision in place was the selection of the aforementioned sample of academic results from years 2005-7. Hence, finalists from 2005, 2006 and 2007 were included. The rationale for this was to counter any statistical anomalies that might occur if the study had focused solely on one particular year. For example, 2006 may have been a year when the results differed drastically to other years. Hence, a study focusing solely on the 2006 cohort would be a misrepresentation of the broader spectrum of results, whereas a sample spanning 2005-7

would be more representative of the performance of a typical engineering student cohort. Finally, both BEng and MEng students across all engineering disciplines (e.g. Mechanical Engineering, Electrical & Electronic Engineering) were included in the study.

For the method of analysis, it was decided that measuring academic performance by percentage increase/decrease would be expedient. Therefore this study measured:

- overall percentage increase in degree results for the 40 placement students;
- overall percentage increase in degree results for the 40 non-placement students;
- the top ten individual percentage increases in degree results by placement/non-placement students.

Overall percentage increase was calculated by first calculating the percentage increase of individual academic results (i.e. subtracting the base year results from the final year results, then dividing this figure by the base year figure and finally multiplying by 100). In essence, it calculates the extent to which the student in question has augmented their academic performance from the start of their degree to the time they completed. The formula for this is as follows:

$$\frac{(yX - y1)}{y1} \times 100$$

where

y1 = base year (first year's final mark/score)

yX = final year's final mark/score

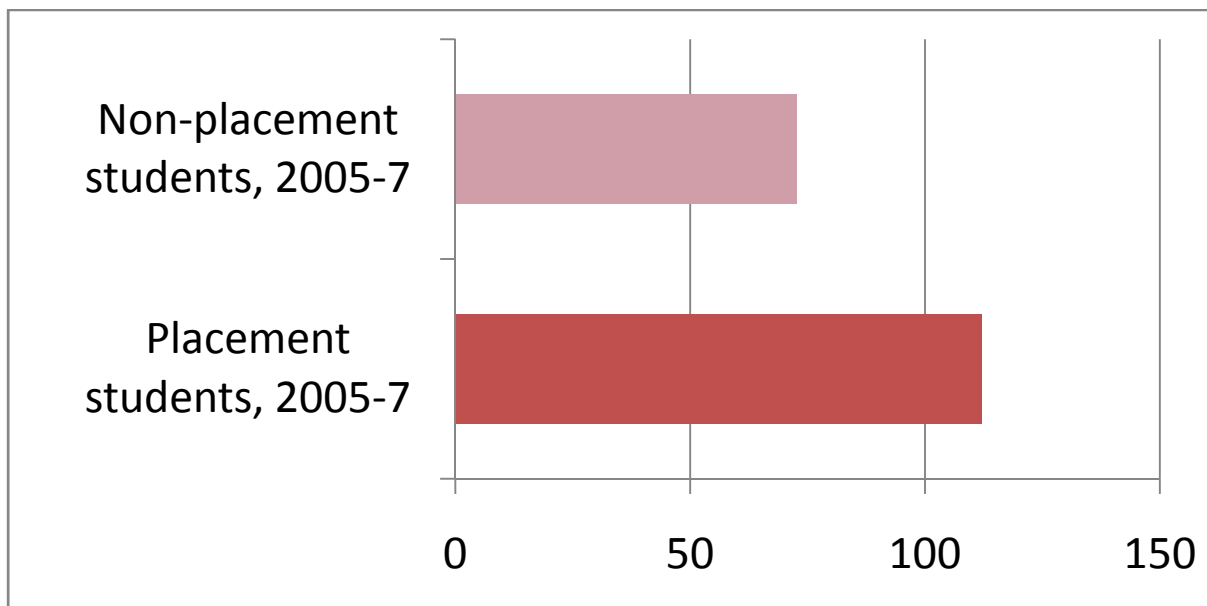
Secondly, once the percentage increase was calculated for all 40 individual samples in the two main groups (i.e. placement and non-placement), they were totalled up for each group respectively. Hence the 40 individual percentage increases for placement students were added together to provide the overall percentage increase in degree results and the same was done for the non-placement group.

Analysis and discussion

The computation of overall percentage increase in both groups of 40 illustrates a substantial difference in academic attainment. The overall percentage increase for placement students equals 112%. This figure subsumes the placement students from 2005-7 and thus addresses (to an extent) statistical anomalies that may occur in any given year.

In contrast, the corresponding statistic for the non-placement cohort equates to 72.8%, thus representing an overall percentage difference of 39.2% between the two cohorts over the same period. This difference provides supports the existing body of evidence that suggests a correlation between placements and academic achievement. Figure 1 illustrates this difference.

Figure 1: Overall percentage increase in degree results, 2005-7 for placements students and non-placement students



The other measure employed to test the causal relationship between an industrial placement and better academic performance, is the recording of the top ten highest individual percentage increases in degree results by placement/non-placement students.

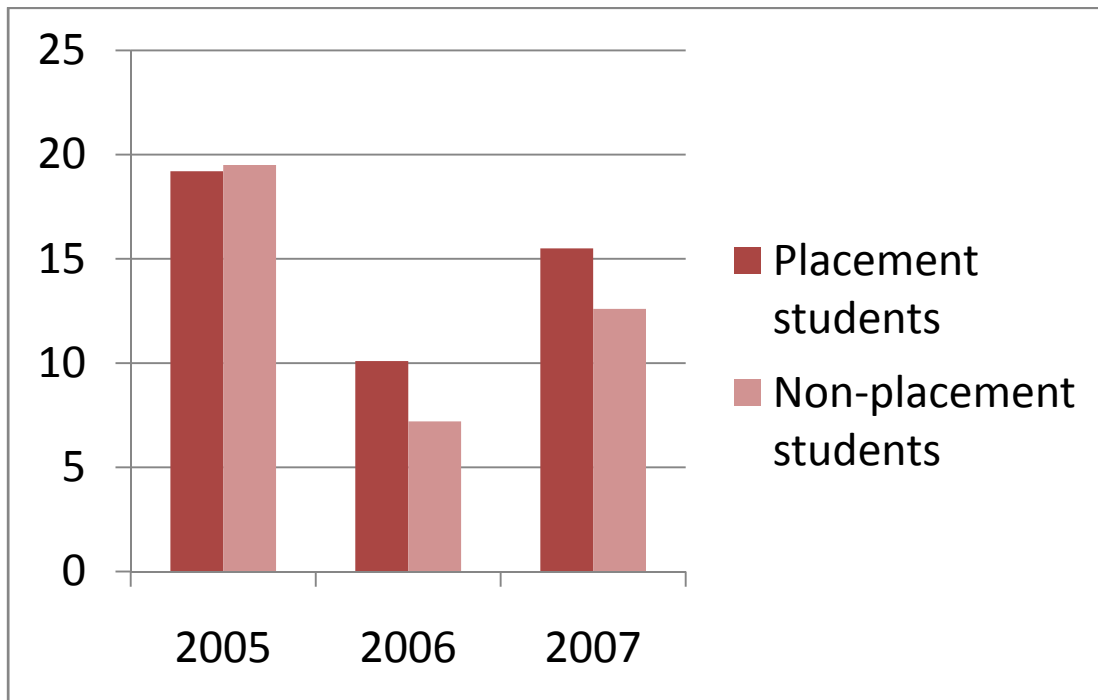
As with the overall percentage increase, this measure is obtained by considering all engineering disciplines and the years 2005-7. By isolating the best performers, this measure enables one to track which group featured most in the top ten of highest percentage increases.

Figure 2 illustrates the results of the top ten highest percentage increases regardless of year, whilst figure 3 shows the best individual performance broken down by year and group.

Figure 2: Top ten students and percentage increase by cohort

Placing	% Percentage Increase	Group
1st	19.5	Non-placement
2nd	19.2	Placement
3rd	18	Placement
4th	17.5	Non-placement
5th	15.5	Placement
6th	15.5	Non-placement
7th	13.8	Placement
8th	12.6	Placement
9th	12.6	Placement
10th	12.3	Placement

Figure 3: Single highest percentage increase by any one student, by year (per cohort)



Whilst figures 2 and 3 illustrate that it is in fact a non-placement student that achieves the accolade of having the highest percentage increase amongst all those sampled (albeit only by 0.3%), closer inspection of the results highlights two salient points.

Firstly, placement students feature seven times in the compilation of the top ten highest percentage increases in figure 2. When assessing the BEng and MEng cohorts individually, (not included within this paper) the results remain the same; placement students still dominate the majority of places in the top ten.

Secondly, figure 3 illustrates the marginal superior percentage increase of the non-placement student compared with the placement student for 2005. This marginal difference stands at 0.3% (2005 figures: placement student figure, 19.2%, non-placement student figure, 19.5%).

However, when observing years 2006 and 2007, it is indeed the placement student that has the superior percentage increase with a difference over the non-placement student of 2.9% for both 2006 and 2007. (2006 figures: – placement student figure, 10.1%, non-placement student figure, 7.2% and 2007 figures: placement student figure, 15.5%, non-placement student figure, 12.6%)

The findings from the two measures, (that of overall percentage increase and that of top ten individual percentage increases) seem to corroborate earlier studies and point towards a strong correlation between participation in placements and academic achievement. This argument is strengthened by the fact that the biggest gains in percentage increase occurred amongst those who were previously underperforming (i.e. those achieving a credit-weighted average mark of a third - average <50%).

So why are industrial work placements responsible for augmenting academic performance in students? Some have postulated that meta-cognition (learning to learn) is responsible for the improved performance of the student returning to their final year of study after their placement. Raelin (2000) identifies meta-cognition as an inherent value-added trait of work-based learning. It is possible that the nature and environment of an industrial work placement (and contact with professional work colleagues) instils the meta-cognitive skills necessary for personal reflection, development and enriched independent learning. Therefore, on returning to university, the student transfers this new approach to her/his studies and excels.

Another hypothesis is that the accelerated development of transferable skills (e.g. time management) and the associated traits (e.g. maturity) that stems from a year in industry enables the student to perform to a higher standard scholastically. It is not difficult to recognise that the application of skills needed in a professional work environment are similar to those necessary to excel in academia. Indeed, it has been reported by engineering academic staff at the University of Leicester, that students returning from a year in industry display an enhanced level of maturity and focus, thus giving some weight to this hypothesis.

Conclusion

By utilising data from the University of Leicester's Department of Engineering, this paper has examined the efficacy of industrial work placements on improving academic performance amongst engineering students. Evidently, the findings illustrate a causal link between placements and improved academic performance. The robustness of the statistical evidence is limited by the sample size and the sampling methods adopted. Further research might usefully compare placement students' results with those of the entire cohort/year of engineering students.

Limitations aside, this research provides further justification for the presence of quality-assured industrial work placements in academia, as such programmes not only augment the employability of the student, but they also enhance their maturity and academic prowess.

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