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Making co-op work: An exploration of student attitudes to co-op programs

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Abstract— Engineering and computing at university both have a long tradition of co-operative education which plays a vital role in developing students' applied skills and giving confidence to both students and potential employers. Co-op education refers to relevant work experience integrated into a course. The main motivation for students in completing a co-op program, or *placement*, is in their increased employability skills; however, students cite other benefits such as increased interest in their subjects at university, improved grades on return from placement and support for career decisions. A study was designed to explore the reasons why students did not take a placement, and we considered both those students who tried but were not successful in securing a placement and those who did not apply for placements. The qualitative study revealed that students who applied but were not successful had in some cases limited their options by being selective in the placements for which they had applied. For some, it came down to excessive competition for the roles. For those that did not apply, stated reasons included anxiety about their abilities, sacrifices (such as giving up part-time paid work and apartments), concern about losing their study skills and difficulties in reconciling family and social commitments with the time requirements of full-time work. This paper explores the findings and asks how we can make co-op programs work for students.

Keywords— *Professional Identity, Employability, Computing*

I. INTRODUCTION

In the UK, there has been considerable interest in the prospects for computing science (CS) graduates when they leave university. A higher percentage of CS graduates are unemployed than the overall average. Indeed 13% of CS graduates are unemployed after 6 months, compared with engineering 9% and mathematics 9%, while the overall figure for all subjects 8% [1]. Undertaking a work placement during study has been found to enhance employability (for example [2], [3]). However, a recent report from the National Centre for Universities and Business (NCUB) highlighted the dwindling number of computing students undertaking placement, down from 30% to 26% [4]. Different models for student co-op programs or placements exist, however for the purpose of this study a placement is considered to be paid work with a company for a period of between 3 months and one year. The reduction in numbers taking a placement highlighted by the NCUB study relates

specifically to the 'standard' one year paid placement which normally attracts some academic credit, certainly some academic oversight for example, access to a placement tutor and pre-placement support. Before computing courses give up entirely on the one year model, which has been shown to be a good option for employers [5] the reasons behind the reduction in uptake should be explored.

This paper describes a study of second year computing majors at a Scottish university. The study was designed to explore the reasons why students did not apply for the one-year placement. Where students applied but were unsuccessful the study asked about their perceptions about why they had been unsuccessful to date in their applications.

II. BACKGROUND

The university has a one year paid placement which attracts academic credit, enabling students to graduate only 6 months after the non-placed students, and with significant industrial experience to complement their technical skills. The university places approximately 40 students every year which normally constitutes about a third of the second year student cohort. In addition, the university is active in a Scotland-wide paid placement project, e-Placement Scotland, designed to work with employers to create placement opportunities and advertise them across all Scottish universities and colleges [6]. These placements are most commonly 3 month summer placements and do not attract academic credit. The e-Placement Scotland project team organizes presentations at each university in Scotland with a view to promoting placements and explaining the application process. Project resources include an application website, CV advice and interview preparation techniques. The university itself encourages students to apply for both types of placement and to take part in pre-placement activity including CV workshops, mock interviews and mock assessment centers. To increase the quantity and quality of applications for placement, new interventions were designed. The main intervention was the introduction of a structured program, Placement Academy, run during the first semester, designed to prepare students to make applications and be prepared for interviews. Initially

there was a high level of engagement in the Academy events however attendance dropped off during the semester. The sample in this study comprises students who applied for placement and were placed, those who applied but were unsuccessful, and those who did not apply..

III. THEORETICAL FRAMEWORK

Student co-op education offers work based learning opportunities and has been found to be an effective way to provide relevant employment skills, experience and awareness of employer culture. The evidence that placements are valuable to students both in terms of employability and academic achievement is strong (for example, [4], [7], [8], [9]). Research suggests that student placements (at times referred to as work integrated learning, co-operative education and work based learning) enhance student skills, knowledge, competence and experience ([10], [7], [11]). Students gain relevant and paid employment whilst employers seek commitment, communication skills and specific aptitudes pertaining to degree type. Students who have taken a placement are at a distinct advantage over students who have not when applying for work after graduation [12]. Employers benefit from student placement too. Recent research suggests that graduate recruiters estimate 37% of graduate vacancies will be filled by applicants who have already worked for the organization as a placement student [13]. Employers cite other advantages including bringing new skills into an organization and having a specific task completed [5].

However, research in the UK shows there are declining numbers of students participating in placement [13]. Brooks and Youngson [12] suggest students do not see future remuneration in placements, 'long term benefits are not always appreciated with fewer students engaging in the process'. Lowden reports upon the high expectations of the employer, 'graduates need to demonstrate a range of skills and attributes that include teamworking, communication, leadership, critical thinking, problem solving and often managerial abilities or potential' [14]. His report acknowledges that these are often acquired through work placements and calls upon higher education institutions to create opportunities for student placements of 'significant duration' (p. 25). Docherty states that students are less geographically mobile than they were 20 years ago and are often unable to take placements that are too far away from their abode [13]. He further suggests that students are reluctant to move away from their cohort, and that they may need to maintain their paid employment and thus cannot risk a placement.

In a study of computing courses, declining participation rates were acknowledged in the National Centre for Universities and Business (NCUB) report, 'on average 26% of third year computing undergraduates- and 6% across all years – undertook a recorded work placement' [4]. In a study of higher education institutions in the UK, Banga & Lancaster found that placement staff cite a lack of motivation as the most significant factor (23% of respondents) in students not applying for

placement, followed by students not feeling prepared to apply (21%) and lacking confidence/ fear of rejection (21%) [15].

In terms of university interventions to prepare students for placement and encourage uptake, Feldmann and Sprafke note the lack of empirical research on how placement can be implemented effectively and they further point to the importance of longitudinal studies to gain deeper insights into student development of competences whilst on placement [16]. A longitudinal study following students onto and through placement into graduate employment may have benefits in providing reasons for students to participate.

Student motivations for taking a placement include to improve job prospects, support their career decisions and to earn money [5]. These are all positive reasons for students to apply. Less is known about the reasons behind those students who are eligible deciding not to apply and the factors that students themselves believe act as barriers to successful applications. Based on the literature review, the following research questions emerged:

(1) What reasons do UK students cite for not applying for a work placement? (2) What local and cultural issues lie behind students not going on placement?

IV. METHODOLOGY

A mixed methods approach was taken using both a quantitative and a qualitative approach. A questionnaire was designed, based on the findings of the literature review, to ask students in the second year of the course whether they had:

- **(Group A) Applied successfully for a placement:** students were then asked about the recruitment process and how they had prepared
- **(Group B) Applied but had not yet been successful in securing a placement:** students were asked about the number of placement jobs they had applied for and the nature of their applications to date
- **(Group C) No applications made:** students were then asked whether they had been actively engaged in the preparation activity and the reasons why they had not applied

Three separate questionnaires were used, based on the situation of each student interviewed. The questionnaire mixed factual questions about age, country of domicile and ethnicity combined with open questions about their experiences of placement. Specific questions were asked about a range of pre-placement activity that had been offered and about their experiences of applying. Placement data was uploaded to NOVI for analysis.

V. RESULTS AND DISCUSSION

During three separate interview sessions, all second year students attending class were invited to participate. In total, 71 interviews were conducted (n=71). Of these 19 had secured a placement, 18 had applied but had not yet secured a placement and 34 students had not applied for any placements. Overall,

90% of the participants were male, 10% were female; 63% of the participants were aged between 17 and 22, 26% were aged between 23 and 28; 10% were aged between 29 and 34 and; 7% were aged between 35 and 40. The characteristics of the three categories of students are given in Tables I and II.

TABLE I STUDENT CHARACTERISTICS: GENDER

Characteristics	Category		
	Successful	No placement yet	Not Applying
Female (n = 7) 10% of total	16%	11%	9%
Male (n = 64) 90% of total	84%	89%	91%
Total (n=71)	100%	100%	100%

TABLE II STUDENT CHARACTERISTICS: AGE

Characteristics	Category		
	Successful	No placement yet	Not Applying
Age 17-22	53%	50%	76%
Age 23-28	31%	17%	15%
Age 29-34	10%	17%	6%
Age 35-40	5%	17%	3%

Students were initially asked whether they had been aware of the possibility of placement before applying for the course. Of those that had applied successfully 53% had been aware, of those applying but not yet successful 56% had been aware. Of those that were not applying for placement 71% had been aware of placement opportunities. A larger percentage of students knew about placement but were not applying which suggests that publicizing opportunities for placement does not necessarily influence intention to apply for a placement. The data collected from each of the three categories is now explored.

A. Group A - Applied successfully

This participant group, who had applied and secured a placement, is of interest in this study as a means of comparing their responses with the other two groups. On average students in second year had applied for 4 placements.

Table III shows their responses to the question of whether they wanted to do a placement as part of their course.

TABLE III STUDENT RESPONSES REFLECTING PLACEMENT PREFERENCE

Statement	Student responses as %		
	Strongly agree/ agree	Neither agree nor disagree	Strongly disagree/ disagree
I wanted to do placement as part of my course	79%	21%	0%

Participants were asked about their level of engagement with the pre-placement preparation activity and 90% of students had attended placement presentations, the Placement Academy program or a mock interview with the careers service. Table IV reflects their engagement with preparation activity. Participants could select multiple activities.

TABLE IV STUDENT RESPONSES REFLECTING PRE-PLACEMENT ACTIVITY

Student responses as %			
Placement Academy	Placement presentation	Careers Interview	No activity
52%	52%	26%	10%

Students were asked if they thought there were any drawbacks to going on the one year placement and 17% said that graduating later than their peers was a drawback and 11% said that they would be out of synch with existing classmates. Childcare and 'current job retention' issues were mentioned but did not feature highly in this survey.

B. Group B - Applied but not yet successful in securing a placement

Students had on average applied for 6.5 placements and 63% had been for interview. Only one student said that he would not be applying for further placements. This student had already applied for 29 positions entirely through his own efforts and had instead decided to get some relevant work experience through a work-integrated professional practice course at the university. Taking this student out of the total placement applications, the average number of placements that had been applied for reduced from 6.5 placements to 5 placements.

Group B were asked whether they had wanted to do a placement as part of their program and Table V summarizes their results.

TABLE V STUDENT RESPONSES REFLECTING PLACEMENT PREFERENCE

Statement	Student responses as %		
	Strongly agree/ agree	Neither agree nor disagree	Strongly disagree/ disagree
I wanted to do placement as part of my course	94%	0%	6%

Participants were asked if they had taken part in pre-placement preparation activity and the responses are shown in Table VI.

TABLE VI STUDENT RESPONSES REFLECTING PRE-PLACEMENT ACTIVITY

Student responses as %			
Placement Academy	Placement presentation	Careers Interview	No activity
67%	50%	50%	17%

Asked about their motivations to apply for specific placements all students cited good experience and 83% mentioned future job prospects as a reason to apply.

C. Group C - No applications made

This group of students was also asked if they had originally wanted to do a placement as part of their course. The responses are given in Table VII.

TABLE VII STUDENT RESPONSES REFLECTING PLACEMENT PREFERENCE

Statement	Student responses as %		
	Strongly agree/ agree	Neither agree nor disagree	Strongly disagree/ disagree
I wanted to do placement as part of my course	41%	35%	24%

They were also asked about pre-placement preparation activity and their responses are given in Table VIII. When asked whether anything more could be done to help them be successful 35% mentioned advice related to the application process and 25% mentioned mock interviews.

TABLE VIII STUDENT RESPONSES REFLECTING PRE-PLACEMENT ACTIVITY

Student responses as %			
Placement Academy	Placement presentation	Careers Interview	No activity
26%	9%	3%	32%

The participants were then asked specifically why they had not applied for placement and their responses are given in Table IX. Students were able to select multiple reasons.

TABLE IX STUDENT PERCEPTIONS OF REASONS FOR NOT APPLYING.

Reason for not applying for placement	Percentage citing
Prefer to concentrate on degree	44%
Length of time taken to complete the course	29%
Already in work	29%
Placements not relevant to course	23%
Location of placements unsuitable	12%
Did not know about placement	12%
Not interested	12%
Unsure how to apply	9%
Value social interactions at university	9%
Financial reasons	6%

Table of student perceptions of reasons for not applying.

There was a chance to provide an explanation and students mentioned the following: worried about the level of knowledge that was expected of them, not yet ready and confident about applying and for some they had just arrived at university as direct entrants to the course and felt they had just become accustomed to the course and did not want to leave it so soon after arriving.

To reflect further on why the students had decided against applying we asked if students could see any drawbacks in undertaking a placement. Their responses are summarized in Table X.

TABLE X STUDENT PERCEPTIONS OF DRAWBACKS.

Drawback	Percentage citing
Length of time taken to complete the course	35%
No drawback	26%
Missing out on teaching	15%
Unprepared/ anxious	12%
Lose part-time work	3%
Finance – want to get graduate job	3%

When asked, in the future, what type of placement would suit them best, 82% of students stated that they would prefer a 3 month summer placement.

D. Discussion

Students in all three groups had participated in the pre-placement preparation activity and in all three groups over 40% of students had wanted to do a placement as part of their course. The group who expressed the biggest commitment to doing a placement were Group B who had been applying without success (94%).

This study shows that timing of the placement on a course is critical to student uptake. This echoes findings in the US [17].

It is clear from student responses that the one year placement following on from two years of study was a good model for students: they had consolidated knowledge and were more confident in their approaches to placement. Direct entry students either felt they were not yet ready or were concerned about leaving the course just as they had settled in to a study routine.

The findings contradict the perceptions of placement staff that students are not motivated, as reported in [15]. Instead there was anxiety about leaving the course (44%) and a perception that placement would be a distraction from concentrating on their studies (29%), with only 12% saying they were not interested in a placement. The following quotes from the study echo much of the sentiment surrounding placement uptake in year 2 of the course.

“It would increase course length overall. Could lack up to date knowledge relevant to course when you return”

“Worried about expected level of knowledge - didn't want to be unprepared, felt I lacked possible experience”

Further to this, 29% of students note the problem of maintaining their current employment and issues with continuity, *“I was unsure how my work would be flexible about it”*.

Through analyzing data from all three groups it was apparent that certain advertised placements were popular and received many applications, and students were aware of the competitive nature of these placements. Although this did not deter students from making applications it was noted as a factor for failure to succeed. To increase their chances in a competitive situation participants stated that they would most value advice on making applications (35%) and gaining experience of interviews (25%).

When asked about the placements Group B participants had applied for, there was evidence of students being too selective in their applications. Most had applied for software development placements with specific and immediate benefit to their course of study, however many of the advertised placements related to IT support and network administration. Most of the companies mentioned were located in same city as the university.

In all groups there was a good level of engagement with the preparation activity (90% for placed students, 83% for those applying and 68% for those that were not applying). This preparation work included CV workshops, presentations from former placed students and mock interviews. Even students not applying found the activities useful and insightful.

E. Limitations of the Study and Further Work

The main limitation of the study is the focus on a single year of study. A further study exploring student attitudes across all years and the different geographical locations of placements would be useful in establishing more general claims for increasing placement uptake.

F Recommendations

This study has highlighted the need for further research but initial observations for specific recommended actions would be:

- Encourage students to be less selective in their preferred roles by placing less emphasis on selection criteria when marketing placements.
- Encourage students to consider roles that are not specifically related to their degree choice.
- Continuation and further development of e-Placement Scotland and the Placement Academy program in terms of support offered to students.
- Look into offering travel reimbursement schemes for students who take a placement far away from their place of residence.
- Consider the possibility of childcare vouchers/ fund to aid the uptake of placements for students who have responsibility for dependents.

VI. CONCLUSION

Our study was designed to explore the reasons why students did not go on placement and our participants fell into three groups: those who had successfully applied, those who registered an interest and applied for placements but had not managed to secure a placement and finally those who did not apply for placements.

The study revealed that participants in all three groups engaged to some extent in preparation activity designed to increase uptake of placement. The study revealed that students who had not applied for placement had encountered both real and perceived barriers that included a preference to concentrate on their degree studies and, for the one year placement, the length of time taken to complete the course. For summer placements there was anxiety about their abilities, giving up part-time paid work and a lack of suitable placements available.

The experiences of students who registered an interest varied. Some students were overly selective in the roles they applied for, leaving only a narrow opportunity for a successful outcome. Some students had not undertaken the extensive preparation required for often quite complex and demanding application processes, while some students were simply unsuccessful through the selection process due to the numbers of applicants. The study captures rich data relating to each of these experiences

By capturing student perspectives, the study uncovers ways to increase participation in co-op education to the benefit of computing and engineering students. Two key elements are uncovered which can play an important role in increasing participation; communication of the benefits of situationally appropriate placements; and contextual pre-application preparation. While the data underpinning these elements

comes from students, the elements themselves are aimed at both students and employers.

The data from this survey highlights the local, social and cultural factors of running a student placement program. Diversity of placement options is crucial alongside knowledge of placement programs in a local context. It is essential to offer students considering a placement a high level of support and pastoral care.

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