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Building Student Support for Computing Students: How Do Students Respond to Different Models?

Fiona McNeill
University of Edinburgh
Edinburgh, Scotland
fj.mcneill@ed.ac.uk

Ojaswee Bajracharya
University of Edinburgh
Edinburgh, Scotland
o.bajracharya@sms.ed.ac.uk

Charlie Myszkowski
University of Edinburgh
Edinburgh, Scotland
c.myszkowski@sms.ed.ac.uk

ABSTRACT
Over the last two years in the School of Informatics at the University of Edinburgh, we have implemented a new approach to student support for our undergraduate and masters students, integrating new approaches to practical support and well-being with a range of co- and extra-curricula events, designed to help computing students develop more completely as future employees and citizens. In this paper, we outline the new approach, comparing it with our traditional approach to student support in our department, and consider how successful this switch has been through interviews with twenty-six students. Our research indicates that the key things that students value in student support are reliability and consistency, and that whilst engaging computing students in non-core activities is challenging, there are approaches that can help - in particular, being very specific how students will benefit through attending and allowing flexibility in routes to engagement.

CCS CONCEPTS
• Social and professional topics → Computer science education; Informal education.

KEYWORDS
Student support, co-curricula learning, extra-curricula learning, student well being

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1 INTRODUCTION
The need for robust and well-designed student support systems in universities has never been greater as student numbers increase in many institutions, student populations become more diverse, increasing numbers of students struggle with mental health issues [5] and student expectations increase. There are various aspects we would want a student support system in a computing department to address. As well as increasing demands for high-quality pastoral and logistical support for students, there is an increasing awareness in computing departments that passing technical courses is not sufficient for the tech leaders of the future. Students need co-curricula themes around ethics and the social implications of computing to be a fundamental part of their degree. Additionally, like many computing departments, our student body is male-dominated, primarily white and Asian, and mostly representative of higher socioeconomic backgrounds. We have worked hard to shift this and are seeing increasing diversity in our student populations but our data shows that students that don’t match the stereotypes of computing students tend to have lower confidence and less sense of belonging.

In our research-focussed school, student support has been done for many years through the Personal Tutor system. Each student was assigned an academic as a Personal Tutor (PT) and most academics acted as PTs - usually having 10-20 students each. In theory, students were assigned to a single PT throughout their time in the department and PTs were responsive and available to student queries. In practice, the provision was very variable: some PTs were highly engaged and supported their students well whilst others were unresponsive and sometimes uninterested in their students. Whilst many kept the same PT, academics frequently move institutions or get bought out of admin duties due to large research projects and so on, meaning many students had two or more PTs during their time. Co-curricula activities were ad-hoc and limited, and little thought was given to developing confidence and belonging in students.

In academic year 22/23 we began the move to a new cohort system of student support - first with incoming students only (UG1 and MSc) whilst returning students remained with their PTs, and then in academic year 23/24 we moved all students onto the cohort model. In this model, students are assigned to a cohort with a Student Advisor (SA) - a member of professional services staff whose full-time job is student support - for pastoral and logistical issues, and a Cohort Leader (CL) - a member of academic staff - whose main jobs are to provide academic input to advice the SAs are giving, as well as to lead co-curricula and extra-curricula activities for their cohort.

Whilst we believe this approach is promising and offers some advantages over the PT system, there have been challenges in its implementation and difficulties with getting students to engage with it. In this paper, we reflect on what we have learnt through the implementation process and how that helps us to shape a process in which we are developing our students to become the computer scientists of the future. In particular, we draw on interviews done with 26 undergraduate students from two groups: those who were in 1st year in 22/23 and who have only ever experienced the cohort system (12 in total) - referred to as the SA group - and those who were in 2nd - 4th year in 22/23 and have recently moved from the
PT system to the cohort system (14 in total) - referred to as the PT group. We asked them to consider how well supported they feel, how well they feel they have been able to develop relationships with academics, what extra- and co-curricula activities they value, and how they can be incentivised to prioritise these over the myriad of other calls on their time.

2 BACKGROUND

Student support can cover a spectrum of activities ranging from advice from academic staff and course tutors about studies to careers and financial support. In the UK there has been a history of having individual support in place for students with many institutions using a personal tutor system. In places with PT systems, the relationships between the student and tutor tends to determine the success of a PT scheme. Students find support mechanisms with a personal or inter-personal dimension most effective [4]. However, the increasing levels of support expected to be provided by a PT has led to some PTs lacking the confidence to support students as they find themselves dealing with situations beyond their expertise [10]. Furthermore, time has been recognised as another challenge to personal tutoring. The pressures regarding time have made it difficult to create an effective student-personal tutor relationship due to meetings feeling rushed or students perceiving tutors as too busy [8]. Previous studies indicate that students tend to most commonly go to their friends on their course and family members for advice and support [4, 11].

[11] discusses a “tiered” support system with the first line of support being academic tutors for academic issues and family and friends first for pastoral support, with a second tier of specialist but practical advice e.g. careers or financial advice and a final tier of specialist counselling and health-related support. An obvious drawback of such an approach is that students do not all have equal access to friends and family who are able to and willing to support them.

It has been proposed there are three main functions a student support system should have [9]:

- Cognitive - supports learning by assisting with course materials and learning resources
- Affective - creates a supportive environment
- Systemic - establishes a transparent and efficient administrative process

All three perspectives are interdependent and interrelated and feed into the main objectives of a support system. The overall purpose of student support is to aid in the development of the student in all aspects. However, due to the range of institutions, geographies, and cultures, it is not possible to generalise an approach for a student support system. As a result, each system needs to be tailored to fit the institution and student body [7, 9].

Another important support to students’ learning is the presence of co-curricular activities (CCAs) alongside their existing studies and coursework. CCAs are non-assessed activities that cover related material or develop skills relevant for future career paths. For example, for computing students these might be hackathons, coding clubs, or participation within research projects.

The aspect of cohort identity is particularly important in institutions such as the University of Edinburgh where the student body includes many diverse cultural backgrounds, students with varying levels of experience, and major differences in socioeconomic status. Socioeconomic status is particularly poignant in this case as half of our students are reported to come from some of the most affluent backgrounds.

CCAs are shown to bolster cohort identity, increase retention rates, and address differences in socioeconomic status [1]. They can also help address an important gap common to most computing courses, including ours: some of our students have significant previous experience in the field, whist others have very little or even none at all [2]. It is however important for a CCA to be related to the students’ subject area to deliver on these benefits as students may feel an activity is not worth their time if it is non-subject specific [6]. This can lead to low engagement and consequently lower academic performance. Therefore, for students to benefit from the presence of co-curricular activities, care must be taken to ensure they are supplementary and relevant to course material.

Gamification is a potential route to bolster student participation [3]. This is where aspects of game design are implemented into non-game environments to return an increase in student engagement with course-related material. There is potential for aspects of gamification in CCAs to improve the student experience in Informatics - such that students participate in a way that surpasses minimum course requirements and become better computer scientists as a result.

3 THE COHORT APPROACH

Students are put into cohorts based on their programme (for example, Computer Science, Artificial Intelligence, joint degrees, etc) and year. Cohorts include between 20-100 students depending on the size of the programme, and each has one SA and one or two CLs depending on the size of the cohort. Within our school, whilst the programme students choose determines the title of their degree and leads to some constraint in course choice, there is very significant overlap between most programmes and therefore most programmes don’t have a very strong identity. For example, CS and AI students may take exactly the same courses in early years and significantly overlapping courses in later years and are unlikely to identify each other as belonging to different pathways, so students within each group may feel more identity to the year group as a whole rather than to their specific cohort. An exception to this is Cognitive Science. Students on this course take some courses that are taken by most of their peers in the department, some CogSci courses that are open to most students but largely taken only by CogSci students, and some compulsory courses in other departments. These students interact much more with each other than with students on other programmes and are a relatively small group, which leads to much clearer group identity within the cohort.

There are eight SAs for the school to cover both UG and MSc students, and 25 CLs - 17 at UG level and 8 at MSc. Within the school, there are around 1000 UG students and 280 MSc students. This leads to a high ratio of students to SAs - but fulfilling this role is the SA’s full-time job. The CL role is expected to involve about 50 hours per academic year. As well as providing academic input to questions students bring to SAs, the main role of CLs is to plan and run extra- and co-curricula events. The SAs also support this
by organising social events and ad-hoc events such as pre-exam drop-in sessions. The extra- and co-curricula activities are intended to be done in cohorts, with the hope that over time students will develop bonds with their peer group and their CL.

In the first year of the scheme, we ran two cohort events per semester, with additional drop-in exam support sessions, a social event each semester, and occasional walking groups with the SAs. We have two semesters each year of eleven weeks each, running from mid September to mid December, and mid January to early April. For UG1 students, the cohort sessions were:

- Semester 1, week 3: adapting to university life: building study skills
- Semester 1, week 7: career planning, with a focus on internships
- Semester 2, week 3: ethics brainstorming session
- Semester 2, week 7: preparing for second year

For the MSc students, the sessions were similar, focusing on orientation activities, ethics sessions and career planning. External experts were brought in for some sessions. This year we have been running similar events for UG1 and MSc, and have introduced a programme for UG2-4, focusing on activities such as careers events, ethics debates and personal development. Alongside these activities, we support multiple student-led events, including multiple hackathons and peer teaching activities where later year students support younger year students.

By far the most difficult challenge we faced was attendance. This varied across different cohorts and sessions, but was rarely more than 20% of the cohort, and frequently less than 10%. Given the numbers in each cohort, this often led to very low overall turnout, which did not create a very engaging environment. This led to a move towards whole-year activities, where events were held for an entire academic year rather than running multiple cohort-based sessions for students in that year. That was more successful in creating events with impact and decent attendance, but significantly impacted one of the objectives of the cohort approach, which is to build relationships between students within the cohort, and between the students and their cohort leader.

4 DATA COLLECTION

The research was conducted by the first author, an academic, the second and third authors, who are both undergraduate students, and three additional undergraduate students. We recruited undergraduate students through mass emails and through the student researchers utilising their networks - for example, through computing societies they are members of. Of the students interviewed, 11 were male and 15 were female. This does not reflect the make up of the student population in Informatics, which is strongly male dominated. Seven had completed high-level qualifications in computing in high school, three had completed lower-level qualifications, eight had no high-school computing and we did not have this data for nine of the students. This is likely fairly representative of the student population.

All researching students were trained in interview techniques, and then planned and conducted the interviews. Corrected transcripts were uploaded to NVivo. A codebook was created collaboratively based on the interview questions and coding was done by the authors, with meetings to discuss coding approach. Several emerging codes were added. Both codes and interview questions differed slightly between the two groups, with questions on engagement with cohort activities and experience of their SA (for the SA group), and questions on their PT experience (for the PT group). Questions around engagement with extra- and co-curricula activities and relationships with academics were the same for both groups. The full questionnaires can be found here.

Interviewed students were selected at random from those who replied to our invitations and could schedule an interview at a suitable time. Interviews were fifteen minutes long and students received a £10 voucher to thank them for their participation. The student researchers were paid for their time on the project.

5 KEY FINDINGS

5.1 Experiences of support in the different systems

Most students in the SA group knew who their student advisor (SA) was and several had positive interactions with them - although a couple did not know who their SA was or how to find them. None had negative experiences with their SA to report. In contrast, the PT group had very mixed experiences with their PTs - several reported strong connections and felt their PT had been extremely helpful but several said their PTs, and those of many of their friends, were highly unresponsive. "In second year my personal tutor basically never contacted me at all (PT1)". Some reported feeling concerned about "bothering" or "wasting time" for their PT when they had questions - a concern which did not appear with SAs. Several had had more than one PT - with one student having three PTs over three years of study. This led to lack of consistency and confusion - especially as these changes were not always well communicated. "I tried to e-mail my personal tutor … but he didn’t get back to me for a while and then when I emailed again, it turns out that my personal tutor had changed and he was like go e-mail this other person (PT)".

When PT students did get good support, they felt their PTs were able to support them over all necessary topics, and their expertise in courses and programmes was particularly valued by some students. "[They] gave me a give a good summary of all the courses I’m taking before this semester started and made sure I was happy with the contents with the balance, with everything. So, I guess I value the expertise".

The move from a PT system to an SA system thus seems to offer significant benefit in terms of consistency of experience for students. As student interaction is the focus of the SA’s job, their availability is better and they are less likely to change frequently during a student’s time in the school. PTs, as academics, can give the impression, either through preconceptions of students or through the PT’s own behaviour, that they have better things to do than support students; this does not seem to be an issue with SAs. On the other hand, SAs are less able to offer course-specific input, and will need to work with Cohort Leaders (CL) to ensure students have access to this. CLs did not factor at all in students’ discussion of their support structure. One or two mentioned CLs, but it became

1When quoting students, we indicate whether they were part of the PT or SA group.
apparent that they were in fact referring to their SA and did not have a clear idea of who the CL was or what their role was.

5.2 Relationships with academics
Some of our SA group felt their SA knew who they were, but none felt that any academic did. Few in this group had developed a relationship with an academic (to the extent that they would expect this academic to know who they were), but the fact that they were all first years and in large classes is a factor here. Those that did develop a relationship achieved this through engaging with non-teaching small group activities such as our listening groups (groups run for students from particular demographics to better understand their experiences). “I don’t feel like there’s [academic] staff members I could actively go talk to that I know, like if I went to talk to someone, I’d be going to seek out a stranger who, yeah, technically is the designated role. But I have no idea who they are. Like, no relationship to them (SA).”

This was echoed from some of our PT group, who felt their PT did not know who they were, but others had developed good relationships with them. Students in fourth or fifth years mostly cited their project supervisor as the academic who knew them best - unsurprisingly, as they will have had the most contact with them.

Most students said that they wanted to have relationships with academics and were bothered that no academic knew who they were (where this was the case), but a few said it didn’t matter. Most said they had no idea how to begin to build such relationships. “I would appreciate that there are more opportunities to do that [connect more with academics], but I currently don’t know how to increase it because I think they’re overworked as they currently are. But if it was possible to do it, I would appreciate it(PT).”

5.3 Extra-curricula activities that are valued
We spoke to both groups about their engagement with extra-curricula activities, including cohort activities (for the SA group), societies, and other activities. We asked both groups to consider what they thought the school should provide here, and what they wanted to engage with.

Most focussed on developing skills relevant to their degrees. Hackathons were the most mentioned activity, but careers-related events and tech shows were also popular. “What attracted to me to them [hackathons] is the opportunity to collaborate with my peers and work on a project that’s quite different from your normal university kind of coursework stuff (PT).” Many students mentioned wanting to learn skills relevant to their degrees, such as additional programming languages and participating in study groups. Understanding more about what was going on in the school (for example finding out about the cutting-edge research University of Edinburgh academics are doing) was valued but most students felt they were not really part of the school and would value feeling more included. Social events that involved mixing between staff and students was mentioned. Younger students also mentioned opportunities to mix with (and hear from) older students and the opportunity to hear from people in industry - especially from alumni as this was mentioned several times. Some typical suggestions include the following:

“I think group learning in clubs and societies (SA)”

“Much more frequent socials. Just staying really informal and like us getting to know each other. It would be great because at some point you just kind of feel it can be quite isolating, just like doing uni and then going home and doing more uni (SA).”

“There’s only so much you can chat about in the five minutes before or after a lecture. So I think it would be great to do loads of [informal social events] (SA).”

“I think like tours walking around the city, visiting important attractions, especially for people who show up late due to the visas. (SA)”

“More casual talks with maybe a different academic member every once in a while. It would be nice to see what they’re researching on, what their lab is like (PT).”

“The chance to network with people that are interested in the same thing (PT).”

“I think there’s other kind of technical skills and informatics that you don’t really learn in your degree, but you are kind of expected to know (PT).”

Although activities such as hackathons were very popular, other students said they thought computing-related activities were too focused on coding and competition, and suggested it was important to include extra-curricula activities reflect the breadth of Informatics and computing-related jobs (rather than narrowly focusing on coding) and that collaborative experiences were valued more by some than competition. There may be diversity issues around this, as students from less traditional CS demographics such as women may be less drawn to the conventional, “geeky” activities.

The peer support systems were mentioned multiple times as something that was valued - with older students sometimes suggesting it would be good if this continued beyond second year. Many students engaged with student societies - mostly within the school, but some showing a preference for engaging with non-computing activities.

Overall, 21 of the 26 mentioned attending events run by student-led computing-related societies, with a particular focus on practice-related events such as hackathons but many also mentioning social events. In contrast, only 13 mentioned attending the cohort (faculty-led) events, and 5 attending peer-support groups.

5.4 Reasons for engaging or not with extra-curricula activities
Engagement with non-course-related activities is something we have been struggling within the school. One of the purposes of doing this research was to try to understand how to better engage our students with activities we felt would help them. Providing activities that students are interested in is clearly the first step to improving attendance, but is not the only factor.

The first factor that students mentioned was finding time to attend sessions. Students are very busy, especially those with part-time jobs. Timetabled sessions sometimes came at times they couldn’t make, or too close to deadlines or exams. Even if they were able to make a session, students showed reluctance to use their valuable time to attend sessions where they weren’t that clear on what they would get out of it. “Mostly [I care about] how useful are they and are they worth of my time (SA).” “[I’ve] not engaged with activities mostly because time management. Sometimes it gets very hard to stop
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5.5 The role of incentives in attending extra-curricula activities

We were intending to introduce a badge system for our cohort-based activities this year. This would have had a two-fold benefits. Firstly, it would give students tangible benefits for attending and engaging with activities and would help provide evidence of transferable skills that could be exported to a LinkedIn profile. This would indicate to students that we value these activities and the time they devote to them. The second benefit would be that in order to achieve the badge, attendance alone is not sufficient - we intended to ask our students to develop ideas for improving existing sessions or creating new ones, so that over time our activities became highly student led. This has not happened this year due to logistical challenges in implementing the badges but is something we would hope to implement in future years. We therefore explored how our students would respond to this as part of this research.

In general, the response to this was positive. Students said they felt this would be helpful for making the effort they put into activities feel recognised which ties into the comments above about getting something tangible out of their engagement. Improving CVs is a key focus for students, and they were enthusiastic about badges that could support that. "I feel being recognized for it would also be some kind of feedback to me... I think that would be something really valuable to me as well (SA)." "I could see that be a good incentive. I definitely would consider it more (PT)."

It was clear from their comments that in order to be successful, such an incentivisation would have to be meaningful. Students weren’t interested in a meaningless symbol - understanding how such a badge would improve their CV and how they could use it to evidence skills to employers was essential. It would also need to have fairly low overheads. Students mostly indicated that they would be prepared to engage in meaningful activities to earn badges - but mundane things - or things that could easily be forgotten - like tracking their own attendance would be off putting. "If it was a simple system, I think that it could very very easily get bit overcomplicated like log your hours and and like do all of this stuff and then everyone just gonna forget at some point and then once you forgotten once you’re just not gonna do it (SA)." However, some students were not interested in working towards badges, indicating that such incentives should be optional.

6 DISCUSSION, NEXT STEPS AND LIMITATIONS

This research has been extremely helpful for us to understand what Informatics students want from a cohort-based system and how we could adapt to support them better. We discuss below the steps we are planning to take to improve the system for our students - but we first reflect on how successful we feel the switch in approach has been.

From a student-support angle, the most obvious impact of the switch is that the PT (academic) has been replaced by an SA (professional services). There are many important advantages to this, particularly that SAs focus their full working lives on student support - meaning they are well placed to know exactly how to respond to relevant situations and where to direct students to get the support they need. For example, in situations where students have required urgent mental health support, SAs have been able to take immediate appropriate action and then continue to follow up with the student in a regular and consistent way, liaising with well-being officers and other professionals where necessary. Our experience of PTs performing similar roles has been much more hit and miss, with PTs not always knowing the correct place to get help for students, since for each PT, this is a situation they encounter very rarely. Additionally, PTs tend not to talk to each other much about their PT roles, whereas SAs work in a group space, and PTs do not always follow up with the student methodically, as they have many other calls on their time. From a student support perspective, we feel this switch has been beneficial. In particular, the effective and systemic functions that a support system should serve are better addressed within this system compared to our previous student support system.

However, a key challenge that this creates is that - since the main support person for students has switched from an academic to a member of professional services - the students then find themselves without links to academics. It was envisaged that this academic connection would be replaced by a connection to the CL - but this is dependent on students engaging with the events that the CLs are running, and whilst we have plans that may improve this, this is proving very challenging. Most of our students did not feel that
lack of connection to an academic had a severe impact on their day-to-day lives, but most did express a desired to form this link. This lack of a connection becomes a particular problem in later years of Informatics - where references and specific careers advice become important. There are ways in which students can build this connection - for example, engaging closely with teaching staff and getting involved in school events - but the benefit of the PT system was that every student had a PT which they were obliged to engage with at least occasionally, meaning even less-engaged students did not slip through the net. We are still working on ways to address this gap, but we envisage project supervisors (who have been identified in this data as crucial academic contacts for later year students) having a larger role to play in supporting our future computer scientists, at least for final-year students.

In terms of managing the move from one system to another, we are working with any students we have identified as depending strongly on their PT to ensure their transition to their SA is smooth. This research shows that there should be fewer problems with SA interactions than PT - but we need to work with SAs to make sure they can bring in CLIs with course-based questions so that their support is particularly relevant for those studying computer science.

Our programme of extra- and co-curricula activities is not currently as polished as we would like as we are introducing multiple new events for students of all years simultaneously but our intentions for Informatics-relevant improvements are:

- To focus on meaningful group activities - to foster learning and community building by doing
- To pay attention to crunch points in the semester to make it easier for students to attend - and to vary times of sessions so that at least one will suit a wide range of students
- To focus on how we communicate with our students about events, both to raise awareness of what will be happening and to be really clear about what students would gain from attending. We are looking into utilising social media channels more effectively and considering hiring a student intern to help with our intention not to simply highlight cohort activities but to create a streamlined view of all school-related activity.
- To ensure there are a range of opportunities that suit a wide range of students - providing plenty of opportunities not just for the most popular activities, such as hackathons, but for others too.
- To ensure that there are opportunities for students to engage with people within the industry - especially alumni and fellow students in different year groups.
- To build in more opportunities for whole school activities - where staff and students can mix and learn more from each other. We have recently started a Discover Informatics series. This involves a range of people in the school (academics at all levels, students at all levels, professional services) giving lightning talks about what they do and why it’s exciting, followed by wine and nibbles. Events so far have been well attended by both staff and students, and we are planning similar events each semester.
- To work to introduce badges in order to incentivise and reward engagement.
- To provide food!

The importance of communication cannot be over emphasised: several students mentioned wanting us to run events that we were actually already running - but these students did not seem aware of them. There is a big gap between putting on events that students say they want and having a significant number of students actually attend them - effective communication, in channels that the students actually access, is an important part of improving this.

Although this has given us useful insights into the student response to these systems, there may be limitations to how broadly applicable these insights are across the whole Informatics student population. The number of students interviewed represent a small percentage of the whole study body, and it is possible that the kind of students who agreed to be interviewed are more likely to be engaged than those who do not. The demographic statistics already indicate a skew - with female students being much better proportionally represented than male. Nevertheless, we believe that the number of interviews, the number of different channels we used to contact students and the consistent themes emerging from the interviews suggest that this work explores views and ideas that will be meaningful to a large percentage of the study body. In future, we intend to consider more carefully how we can identify and incentivise students who are not engaging well with their studies and obtain a more rounded outlook on how to best support the whole student body within Informatics.

7 CONCLUSIONS

The switch from a Personal Tutor based approach to student support to our new cohort based model within Informatics has been challenging and continues to present challenges. However, overall we feel that the scope it gives us to integrate extra- and co-curricula events more fundamentally into the student journey, and the reliability of having professional service staff in the primary support role, with the expertise they are able to build up through spending their full working lives with the same focus, present important and tangible improvements. The 26 students we interviewed in this research illustrate many of the benefits and challenges of this approach, as well as suggesting ways in which we can improve our student support structure to bring us closer to achieving all the objectives we initially had for this system - some of which have proved more difficult to achieve than we anticipated.

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