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Holistic Peer Mentoring of Computing Students in Higher Education

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Mentoring involves a more senior or experienced person supporting a more junior or inexperienced person over an extended period. It is a common practice in the induction and training of new staff in the software development industry and within higher education [3]. Here, the mentor is not a staff member but a more experienced senior student. Peer mentoring involves less formal roles and traditionally consists of one mentor and one mentee with the mentee driving discussions during meetings. This can positively impact metrics such as grades and progression [5].

Within the author's institution, peer mentoring involved final-year students from throughout the university, from all courses, offering to meet regularly for discussions with first- and second-year computing students. A computing student could meet a different mentor at each appointment, and the mentor would rarely be from the same course or department. Feedback from computing students

who did not engage with mentoring was that it would not provide technical help, they were not aware of it, they did not need it, they did not know anyone involved, and they were hesitant to engage with something unfamiliar. Before the introduction of holistic peer mentoring, computing students could only access technical support through time-tabled classes delivered by lecturers. For example, a first-year foundational programming module would feature two three-hour taught lab sessions and then a two-hour student-directed support session each week.

HYPOTHESES

Holistic peer mentoring moves beyond the traditional 1:1 meeting by embedding support within the technical workflow of a computing student. This model uses five distinct pillars:

1. Weekly Coding Workshops for assignment troubleshooting
2. Social Code-Jams for collaborative project work



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Before the introduction of holistic peer mentoring, computing students could only access technical support through timetabled classes delivered by lecturers.

3. Informal Coffee Mornings to increase service discoverability
4. Proactive Computing Lab Support to assist lecturers during practicals
5. Intensive 1:1 Mentoring for students in high need

As mentees become more familiar with the mentors consistently delivering these sessions, they are encouraged to engage more widely with all these opportunities. Three hypotheses were evaluated:

1. Holistic peer mentoring is more engaging for computing students than the traditional approach of 1:1 centralized generic mentoring provision and therefore will increase the number of mentors and mentees taking part.
2. A holistic approach to computing student mentoring will increase attainment of those who engage compared to those who do not.
3. A holistic approach to computing student mentoring will increase course-progression rates of those who engage compared to those who do not.

Project Outline

The following sections describe the key aspects of the holistic mentoring approach.

WHAT IS HOLISTIC MENTORING?

Most students need extra support, to a lesser or greater degree, from time to time, while studying at university [9]. It may be that academic support is needed when struggling with a particular course topic, or it could be social support that is needed as the student struggles to find their niche while living away from home for the first time [20]. Accessing support, even when it is available and actively promoted, is challenging for many students as they can find it difficult to ask for help [19]. A holistic approach is one that provides a wide range of mentoring opportunities to students, some of which are not presented as a “support service” at all. Once the student has had a positive interaction with a mentor, they may be more likely to access other opportunities. This “gateway effect” is evidenced by the 43% of participants who engaged in multiple types of mentoring events (see Figure 3).

These opportunities for mentor interactions can take different forms to match the changing needs of students throughout their time at university. It should include academic support, opportunities to make friends and build

community, to discover what students do on other courses, and to create a sense of belonging and have fun. In this project, the following opportunities were offered to students.

Coding Workshop: A regular timetabled support session in a computer lab, with access to as much hardware and software as possible, to support as many courses as possible. Promotional materials should make it clear what skills mentors can support so students who need technical help are more likely to find it.

Code-jams: All-day, one-off support sessions where students work on personal projects or assignments together with mentors. These can be promoted as a way to get larger project assignments finished or complete a personal project for your portfolio. Students can collaborate with mentors and students from other courses they might not normally get a chance to meet. To make these less-frequent events feel more special, small prizes can be awarded by the mentors at the end of the day. For example, most progress made in one day, or the student who was most supportive of others and most interesting project. Mentors can use the event to promote other, more regular mentoring opportunities both to attendees and the wider student community via a newsletter.

Coffee Mornings: One or two mentors offer ad hoc advice and a chat to any students who ask along with a free coffee. This activity is really designed around discoverability and helps attract students who might not know about mentoring or be too shy to take advantage of a specific offer like the Coding Workshop. A quick chat over a coffee and the mentor can allay any fears and explain different mentor activities and what is involved. A training script for the mentor can help if the student is nervous during their chat. Questions like “How are you settling in?”, “How is your timetable?,” “Can you find everything,” and “Have you been to the students union or joined any societies yet?” can go a long way toward opening dialog with uncertain students.

One-to-one Mentoring: This is how mentoring was traditionally seen: A single student is (ideally) assigned a named mentor who they then meet either on campus or online for regular chats. This can be the most labor-intensive of mentoring offers as each mentor is realistically only capable of taking on around five mentees for 1:1 support. Therefore, this is often reserved for those students in greatest need of support, for example, those referred by their academic advisor or international students who can often feel isolated [16]. Mentors

Mentors need to be gregarious and pro-active in approaching students in the class, asking what they are doing and offering help and advice.

require training for all interactions with mentees, but 1:1 mentoring is particularly challenging. This is potentially the most rewarding mentoring activity, due to the close relationship that can be developed with a mentee. Note—prior to the holistic mentoring program, this institution’s mentoring service did not provide the same regular named mentor to each mentee; instead, a mentee would see a semi-randomly assigned mentor based on capacity and a rota system.

Computing Lab Support: Here, mentors make regular visits to computer lab project work sessions to provide support. Mentors can be best used in class when it is a practical lab session, and the student is practicing new skills they have already been taught. This can be a good way to raise awareness of mentors with lecturers, who are often unaware of what mentors do. Two students in a lab session run by a single lecturer can triple the number of students who can be directly supported. Mentors need to be gregarious and pro-active in approaching students in the class, asking what they are doing and offering help and advice. Mentor involvement needs careful negotiation with the tutor, requiring their permission and direction. Similarly, the tutor would explain the presence of the mentors and reassure students that they do not have to interact with the mentors if they do not want to. For students who might otherwise be hesitant, this is an opportunity to meet mentors, as they are present in class anyway; the student is not seeking them out. Some institutions employ lab teaching assistants who may fulfil a similar support role, but mentors can still complement this support and use the opportunity to promote wider engagement with mentoring more generally.

WHY DO COMPUTING STUDENTS NEED SOMETHING UNIQUE?

Computer science-based software development courses have one of the highest average dropout rates of any degree course 9.8% [12]. Learning to program requires focus, accuracy, and dedication to many hours of practice. All programming languages have a prerequisite of mathematics, logic, and systematic thinking. Modern software development is conducted in teams of multi-disciplinary specialists. Programmers need the interpersonal skills to work within and manage such complex team dynamics.

Peer mentoring involves students helping others to be more academically successful. A more senior student acting as a mentor encourages a sense of trust in the mentee student as they recognize that their mentor has been in the institution longer and has more experience [11]. A mentor

needs strong interpersonal skills if they are to break down emotional barriers that mentees often feel. Asking for help from a stranger can be perceived as weakness, which is often embarrassing, but asking for help from a friend is easier. Academically high-achieving mentors share certain common skills regardless of the specific course they are from. These general-study skills can be lacking in students that need academic support at the start of their degrees. Examples include scheduling, building strong people networks, multitasking, resilience, and problem solving. Students in need of support often feel vulnerable, embarrassed, and unsure of how effective mentoring will be. A final-year mentor from the same course, or at least the same department, holds the potential for subject-specific support and advice, which can seem more attractive than a mentor provided from elsewhere within the university [8]. This was confirmed in the mentee interviews (see Feedback from mentees), for example, “nice to talk to someone who has been through it.”

WHY DOES PEER MENTORING WORK?

People often have a desire to feel part of a community. This is especially true of students who may be living away from home [4]. Loneliness is a common problem, and students benefit from a strong peer support group of friends. Alongside the desire for community and friendship, there is a focus on boosting grades [13]. Student mentors fulfill these needs when they are from similar courses, and if the same mentors are available reliably, then a relationship with the student can build. Student mentors are not normally involved in grading students’ work, discussions between mentor and mentee are confidential, and mentors are normally from a different cohort than mentees. This means students can feel more free to confide in mentors without fear that they may disclose something that would negatively impact their relationship with lecturers. The focus of peer mentoring is often the mentee, but student mentors report the same benefits as their mentees: personal and professional growth [10]. The proposed holistic approach allows mentors to work together outside the more traditional 1:1 mentoring role while also accessing the mentor support chat platform (see section Communication channels). This encourages a sense of community between mentors, who also find the experience boosts their confidence in terms of interpersonal skills [7] and technical skills.

THE IMPORTANCE OF VISIBILITY AND MONITORING

Making students aware of student-mentoring opport-

unities can be difficult, as universities often overload students with emails from a variety of sources [17]. A range of regular, repeating publicity activities is essential; for example, asking tutors (who a particular cohort will recognize) to show slides, send emails, put up posters, and host in-class visits from mentors to explain the service. Monitoring all student-mentoring activity is important, both to ensure potentially vulnerable students are being supported appropriately but also to check that students from a range of courses are attending. Asking mentors to gather metrics can get a more detailed picture of engagement: How many students are attending, which courses are they coming from, how did they hear about the activity, what kind of support are they requesting, and were there any problems?

Ensuring mentoring is reliable for mentees is important for building community and managing mentors is a professional role that is time consuming [6]. Paying mentors a wage is important and recognizes the work they are doing for the institution while also adding a sense of professionalism and accountability. There should be a single, shared rota that all mentors can see, making it explicit who is doing what and when. Mentors should confirm their attendance at every session and should report absence in advance so other mentors can fill in. Having at least two mentors in every role helps ensure activities still reliably happen, even if one is absent.

COMMUNICATION AND TRAINING REQUIREMENTS

Holistic mentoring involves designing a program where mentors are well trained, have access to good two-way communication channels (with each other and their managers), and provide a wide range of mentoring opportunities likely to attract as many students as possible.

Mentor training: Mentors are themselves students and they need careful selection and training before undertaking any mentoring activities. When interviewing mentors, consider skills that will aid a new mentor: Are they gregarious and outgoing, do they have well developed interpersonal skills, do they have sufficient written and spoken English, and are they successful academically? Once you have a pool of mentors, then training can be provided. This is often easier if the mentors have their own dedicated chat platform, where online training events and videos can be shared.

Training needs to cover a range of skills:

- Active listening, not always trying to provide solutions [15]
- Helping mentees come to a real decision with a timescale (SMART actions)
- Keep it professional, critical, and friendly. Do not get too involved and maintain boundaries
- Ensure mentors are familiar with formal support services and direct mentees to them

- Do not work on mentees' assignments for them
- How to take notes, work through tutorials, join study groups, and solve problems.

Training activities should be video recorded and posted where mentors can re-watch them.

Communication channels: A 24/7 online-mentoring chat platform for anyone to seek support and friendship anywhere, anytime can boost engagement from students [14]. Mentors can moderate communication servers for students, ideally with dedicated channels for different courses and year groups. Mentors should also have a dedicated private channel. It contributes to building a sense of community and belonging [18]. Some students find using chat socially easier than face-to-face conversation, making it a good gateway to mentoring support. Moderation must follow a clearly signposted code of conduct to ensure chat servers are safe spaces, while also making it clear what to expect from staff and mentors online.

Methodology

This is a mixed-methods longitudinal study within a university computing department and was conducted over one academic year (within this institution, the academic year begins in September). Mentors were recruited from the final year of undergraduate courses in computing; mentees came from first- and second-year undergraduate courses and postgraduate master's courses. All participants gave informed consent. The institutional data for the 2030 students (see Table 1) represents the control group used for progression and attainment analysis and their data was drawn from secondary departmental institution data rather than active survey recruitment. Of the total mentors and mentees within the department, 56% of the mentors and 12% of the mentees actively agreed to take part by survey and interview.

Table 1. Recruitment of participants.

Role	Total in department	Survey/ Interview participants (active)	Institutional data cohort (passive)
Mentor	52	29	
Mentee	413	51	
Students not mentored or mentoring	2495		2030

Participating mentors had meaningful interactions, with 51 participating mentees across that year (see Table 1). A meaningful interaction was defined as at least one discussion with a mentee directly, not as part of a group, which was task- or support-focused rather than general chat, where the

mentee confirmed the outcome was satisfactory. Surveys were conducted with all participants, one for mentors and one for mentees, with quantitative questions using a Likert scale and qualitative questions using free text. Textual responses were analyzed using reflexive thematic analysis [1]. These questions were designed to investigate hypothesis 1: Do computing students find this holistic approach engaging? A range of metrics were used to compare students within the computing department in 2024 who took part in mentoring activities with those who did not (see Table 2). Comparisons were also made with mentoring activities in previous years within the department.

Table 2. Comparing participants.

Student type	Numbers for 2024
Mentors	29
Mentees	51
First-year computing students not mentored	440
Second-year computing students not mentored	378
Final year computing students not mentors	347
Postgrad computing students not mentored	865

The two comparative metrics used are defined as:

- *Progression*: Number of students who successfully transition to the next year of the course
- *Attainment*: Overall average module grades for the year.

Results

GROWTH IN MENTOR NUMBERS AND 1:1 MENTORING

From September 2022, the beginning of the academic year, a holistic approach was implemented with computing mentors running more mentoring activities each year while continuing to provide core 1:1 mentoring support, specifically to computing mentees. This is associated with a large increase in the number of mentor-mentee interactions (see Figure 1).

It is also associated with an increase in the number of peer mentors in computing and the number of mentors with 1:1 mentoring roles as the number of students accessing 1:1 mentoring increased (see Figure 2).

AWARENESS AND ENGAGEMENT WITH MENTORING EVENTS

There were five types of mentoring events (Coding Workshop, 1:1 Mentoring, Coffee Mornings, Code-jams, Lab Support), and 57% of mentees took part in one type only while 43% took part in more than one type of mentoring event, at least once. No mentee engaged with all five (see Figure 3).

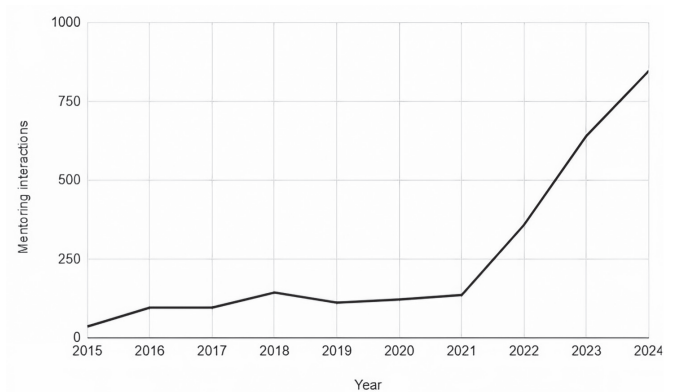


Figure 1. Growth in mentoring interactions by year.

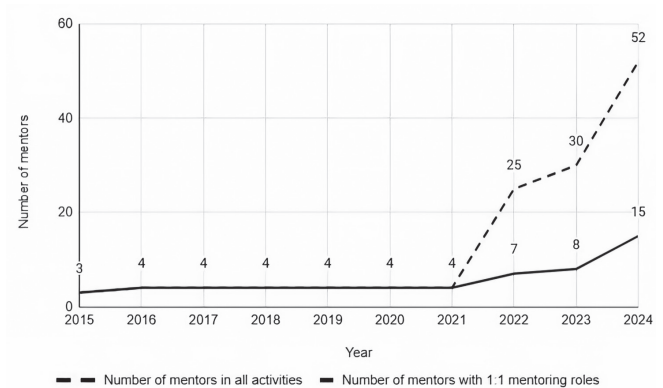


Figure 2. Growth in number of mentors overall and 1:1 mentors.

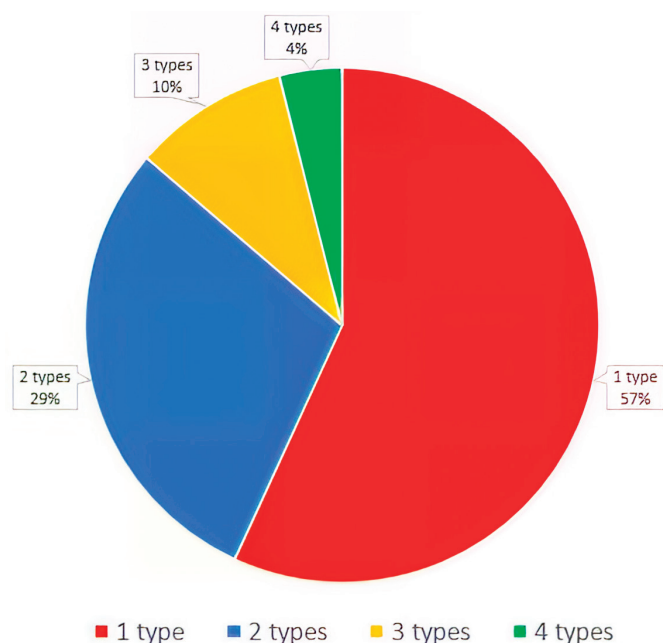


Figure 3. Of the five types of mentoring, how many mentees took part in more than one type?

Of the different events available, the weekly Coding Workshop was the most popular and in-class computer lab mentoring was least popular (see Table 3).

Table 3. Popularity of different types of mentoring.

Event type	Number of mentees taking part at least once	%	Number of mentees who had heard of the event but did not take part	%
Coding Workshop	23	45	20	39
Coffee Morning	19	37	25	49
1:1 Mentoring	17	33	26	51
Code-jam	12	24	21	41
Lab Support	11	22	8	16

FEEDBACK FROM MENTEES

Thematic analysis of qualitative survey/interview responses revealed some common themes:

- *Building a sense of community and belonging:* Being made to feel welcome and that you belong is important. Example feedback: “I had attended one of these, and quite honestly, I enjoyed seeing what other students did that year and certainly was impressed with some of the work. It feels great to see and communicate with other students from various years at these.”
- *Technical support:* Students appreciated specific computing-related technical support from mentors who were also computing students. Example feedback: “I would have struggled without someone explaining the tutorials.”
- *Assignment support:* Mentors are trained in how to provide technical support on assignments without plagiarizing. Example feedback: “Nice to talk to someone who has been through it and knows all about the assignments and has lots of tips.”
- *Learning to code and fix bugs is hard:* Learning new programming languages is hard, and bug fixing can be a difficult and solitary experience. Example feedback: “...helped me fix my code, I'd been staring at it for days.”
- *Regular, reliable, and fast support is ideal:* Asking for help can be hard, but it can be easier when that help is easily accessible and predictable. Example feedback: “Need more mentors and run it at different times to stop timetable problems.”
- *Help with stress and well-being is appreciated:* Student mental health and well-being are growing concerns [2], and peer mentors can help by creating friendly,

“Nice to talk to someone who has been through it and knows all about the assignments and has lots of tips.”

safe spaces where people feel valued. Example feedback: “So nice for someone to give up their time to chat, really helped get me out of my shell.”

FEEDBACK FROM MENTORS

Thematic analysis of qualitative survey responses revealed several common themes:

- *Mentoring boosts confidence:* Mentors should be proactive and gregarious to get mentees, who can be shy, to engage. Example feedback: “It boosted my confidence because I saw that I could actually help others understand and learn.”
- *Mentoring improves interpersonal soft skills:* Mentors must explain complex technical-coding concepts, offer encouragement and personal support to mentees. Example feedback: “I struggle chatting with new people, and this was good as you had a reason and people were depending on you, so you had to do it.”
- *Increases programming skills and knowledge:* Mentees see academic value in mentoring when mentors can provide technical support, but teaching someone requires deep learning. Example feedback: “If you have to explain it, then you really have to know it, so I think it boosted my own grades.”
- *Increases empathy, belonging, and well-being:* Mentors see the difference they can make in mentees’ academic progress; a relationship often forms that leads to rewarding friendships. Example feedback: “Just nice helping people out, makes you feel good.”
- *Getting mentees to engage and promoting events is hard:* Engaging with a mentor feels like asking for help, which students find difficult. Promoting events can be hard when a student’s life is often overloaded with information. Example feedback: “Need more students to engage, but I'm not sure how, maybe more shout outs in class.”
- *Mentoring is stressful and mentors need a lot of support:* Mentors are often asked questions they do not know the answer to. Example feedback: “It can be stressful if they say something personal and it needs to be easier to get them proper help.”

PROGRESSION

Progression refers to the number of students successfully completing their current year and progressing to the next. Students who do not progress are either withdrawing from

While the holistic model likely drove engagement, the increase may also reflect a recovery from Covid-19 disruptions during 2019-2022, when campus life was restricted.

the course, transferring to another course, or retaking the year. One sample T-tests were used to compare the progression rates in mentees with students who were not mentored. Mentees were more likely to progress to the next year of their course than those who were not mentored, the difference being statistically significant in all three groups (see Table 4). Confidence levels were similar across undergraduate and postgraduate populations; effect size and p-values demonstrate with reasonable confidence that the results are statistically significant.

ATTAINMENT

The end-of-year average course marks for mentors and mentees were compared with students who were not mentored. Mentees had slightly higher attainment, but there was not a statistically significant difference. However, master's level mentees did have a statistically significant increase in attainment (see Table 5). The population means demonstrated high precision (CI between 0.01 to 0.015), whereas the mentoring results showed greater uncertainty due to the smaller sample sizes. The highest confidence

Table 4. Progression comparison between mentees and non-mentored in 2024, plus previous years.

Progression in computing.						
Year	First-year undergrad % progressed	N	Second-year undergrad % progressed	N	MSc postgrad % progressed	N
2020	88%	350/398	86%	355/413	92%	384/417
2021	70%	251/359	73%	267/366	93%	686/738
2022	66%	301/456	71%	203/286	94%	830/885
2023	72%	300/417	85%	349/410	93%	568/608
2024	81%	357/440	88%	333/378	94%	816/865
Progression of mentees.						
2024	97%	18/19	97%	17/18	100%	14/14
p-value (<0.05 is significant)	0.0057		0.0100		0.0001	
Cohen's d effect size (<0.2 is small, >0.8 is large)	1.01		0.65		0.47	
95% Confidence interval population	0.017		0.015		0.008	
95% Confidence interval mentees	0.065		0.057		0.052	

Table 5. Comparison of year-end grades in computing.

Average mark in computing.								
Year	1st-years	N	2nd-years	N	3rd-years	N	Master's	N
2022	59%	456	59%	286	64%	301	64%	885
2023	61%	417	63%	410	62%	315	63%	608
2024	61%	440	63%	378	64%	347	62%	865
Average mark of mentors and mentees.								
Year	1st-years (mentees)	N	2nd-years (mentees)	N	3rd-years (mentors)	N	Master's (mentees)	N
2024	63%	19	66%	18	72%	29	67%	14
p-value (<0.05 is significant)	0.057		0.083		0.006		0.020	
Cohen's d effect size (<0.2 is small, >0.8 is large)	0.13		0.22		0.68		0.46	
95% Confidence interval population	0.015		0.013		0.011		0.010	
95% Confidence interval mentees	0.063		0.055		0.034		0.046	

levels were in the master's students, where the impact of mentoring on attainment was most evident.

Note: While the attainment and progression results are promising, it is possible that the participant volunteer mentees were already more proactive and motivated than the average student.

HYPOTHESIS ONE: GROWTH IN ENGAGEMENT AND PARTICIPATION

The implementation of the holistic approach at the beginning of the academic year in Sept. 2022 was associated with a substantial increase in mentor-mentee interactions, rising from 136 in 2021 to 847 in 2024 (see Figure 1). This supports hypothesis one, as the diverse range of entry points (i.e. “low-stakes” Coffee Mornings and technical coding drop-in workshops) successfully lowered the psychological barriers associated with seeking help. Qualitative data suggests the mechanism for this growth in support was the “discovery funnel,” where students who were initially too hesitant to request a 1:1 mentor or seek specific help were “captured” by more visible, informal events, such as at-elbow support from mentors in their labs or Coffee Mornings. However, it is critical to note the growth in participation between 2022 and 2024 coincided with the post-pandemic return to campus. While the holistic model likely drove engagement, the increase may also reflect a recovery from Covid-19 disruptions during 2019-2022, when campus life was restricted.

HYPOTHESIS TWO: ATTAINMENT AND THE POSTGRADUATE EFFECT

For undergraduate students, the impact on attainment was not statistically significant (see Table 4). However, post-

graduate mentees showed an increase in attainment, with their average marks reaching 67% compared to the 62% average of their non-mentored peers (see Table 5). This partially supports hypothesis 2, as most postgraduate master's students are international, and these students often face language barriers and an unfamiliarity with U.K. higher education more generally. Mentoring likely provided a bridge, allowing these mature, qualified, experienced students to leverage their technical skills by explaining to them U.K.-specific academic expectations in a friendly, supportive, peer-to-peer setting. Although it is common for a more experienced final-year undergraduate student to mentor a less experienced first- or second-year undergraduate student, here they would also often mentor postgraduate students. This worked because the postgraduate student may have only been in the country for a few months and may be undertaking a conversion course, where technical skill development needs support, a final-year undergraduate student will have been on campus for two years (three if they went on a placement), and that extra experience is invaluable.

HYPOTHESIS THREE: IMPACT ON COURSE PROGRESSION

The data demonstrates a statistically significant increase in progression for mentees across all levels compared to the wider computing cohort (see Table 4). Specifically, 97% of first-year undergraduate mentees progressed, compared to the 81% average. This strongly supports hypothesis three. The mechanism behind this result is likely the alleviation of the “debugging bottleneck,” mentees specifically noted that mentors helped “fix my code” and they had been “staring at it for days” (see section Feedback from mentees). In a discipline where 9.8% of students drop out partially due

Computer science students often reject generic support because they feel it cannot directly help with their key problems, such as logic errors and syntax bugs.

to the high difficulty of logic and syntax, this just-in-time technical intervention prevents the frustration that leads to withdrawal (see section Computing students).

Conclusion and Recommendations

The primary reason this program succeeded where generic university mentoring failed is its technical specificity. Computer science students often reject generic support because they feel it cannot directly help with their key problems, such as logic errors and syntax bugs. By embedding mentors directly in the lab, where they can triple the support capacity of a single lecturer, the program addressed the specific “loneliness” and frustration of learning to program (see section Mentoring services). The Coding Workshop was the most popular event (45% participation) precisely because it offered immediate technical relief for difficult assignments and projects (see Table 3).

Computing students always had timetabled dedicated support sessions delivered by subject-expert lecturers, but this project introduced peer mentors into those labs and within separate events. This complemented and optimized the support offer within a social constructivist framework. Lecturers provide authoritative clarification, maintain academic standards, and identify structural gaps in understanding; however, students can sometimes find interacting with an expert stressful and be mindful of asking “silly” questions or fear judgement from someone they perceive as being in a powerful position. Peer mentors, on the other hand, can often explain concepts in ways that align with current student vocabulary, appear less intimidating, boost confidence, and foster metacognitive development.

These hypotheses were supported not just by offering “more help” but by building a technical community (see section Why does peer mentoring work?). Participation increased because the program moved from a *deficit model*, where students seek 1:1 help only when they feel they are failing, to a *community model*, where students attend a Code-jam because it is a social activity (see section Mentoring services). Progression improved because mentors functioned as “critical friends.” They shared “tips” and “lived experience” of the same assignments, which increased mentee resilience and reduced the feeling of being overwhelmed by assessment (see section Feedback from mentees). Furthermore, the valuable sense of community was enhanced by the same mentors consistently delivering the same activities, such that relationships grew from familiarity with a group that shares a passion for computing.

LIMITATIONS AND BOUNDARY CONDITIONS

In this pilot study, the mentees are volunteers, but the mentoring role is paid work. This holistic peer-mentoring approach should apply equally well to any higher-education computing department. While the results are promising, it is possible that the 51 participant volunteer mentees were already more proactive and motivated than the average student (see Table 1). Therefore, the higher progression rates may partially reflect the existing traits of the students rather than the program itself. Furthermore, the rise in participation must be interpreted alongside departmental shifts. While the holistic framework provided the structure, the payment of mentors (creating professional accountability) and the presence of a senior faculty manager were significant confounding factors that may have improved the quality of support compared to previous years. There is also the potential impact of students returning to campus from the years of Covid-19 disruption.

Note that what is described here was a proof of concept and therefore does not prove population-wide generalizability. The Cohen’s *d* analysis shows a large effect, 1.01 for first-year progression; however, small samples sizes tend to overestimate effect sizes (see Table 4). Similarly, the *p*-values indicate significance within the study group, but the relatively small sample compared to the departmental population results in wider confidence levels and limits our ability to generalize these findings to the entire student body. However, thematic analysis indicates face validity: “I would have struggled” and “Really helped get me out of my shell,” with evidence from mentees that the program, not just their personality, caused the success (see section Feedback from mentees).

Although there are many different types of computing courses, common themes of programming languages, logic, debugging, and maths underpin all computing courses. Therefore, it is straightforward to design activities that are academically beneficial to all computing courses. This approach could work in non-computing departments if there are similar fun and academically beneficial activities with clear connections to the majority of that department’s courses. Future studies should aim for larger sample sizes across multiple institutions to isolate the holistic effect from institutional variables.

RECOMMENDATIONS

Best practices suggested by this study’s findings:

- A holistic approach means a range of different events throughout the year, linked to mentees’ courses, conducted by the same mentors, from those courses.

Future studies should aim for larger sample sizes across multiple institutions to isolate the holistic effect from institutional variables.

- Mentees may not come unless they feel comfortable about what they are going to walk into.
- Mentees may not return unless their expectations have been set realistically and then met.
- Favor the same subset of mentors running specific events, so mentees and mentors are more likely to form relationships and recognize one another.

Best practices based on the experience of the organizers:

- Prefer a senior member of faculty as manager to confer the importance of the program.
- Mentors need the academic who is managing the program to be regularly present.
- As the manager, it is up to you to stay connected and set the standard and direction.
- Mentors should be paid, as it makes the role feel more professional, valued, and official.
- Lecturers, like students, need reminding about what mentors do.
- Plan for ongoing multi-faceted promotional activities to increase visibility.
- Mentors can have chaotic lives just like any student; they need support, too. ♦

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