

Students' view on applying for part-time work as an on-campus software developer

Per Lauvås jr¹ and Olav Dæhli²

¹ Kristiania, Oslo, Norway

² University of South-Eastern Norway, Porsgrunn, Norway

Abstract. A majority of students work while they are studying. Working will help them financially, but it may also provide other benefits, such as preparing them for work-life after finishing their studies. As academic institutions, we may offer students part-time work, and hopefully facilitate experiences that will have relevance for their further careers.

Earlier studies have investigated how working while studying may impact academic success. There are also reports on how we may rig campus based part-time work so that it will contribute in a positive way in addition to the obvious economic benefit.

Some institutions hire students to work as software developers to create or maintain applications of value to the institution. For IT students, this will provide them with valuable experience, and may also increase their confidence.

Our contribution is to investigate how students view the possibility of working as a software developer for their own educational institution. Through interviews we try to understand what factors are important for them when evaluating such work possibilities. This will be of value to those who are interested in hiring student developers. It will also provide input to how we may organize such projects in order to keep the students satisfied throughout the project.

Our findings suggest that the technology involved in the project is most important. Some students will value that the project involves technology that they already have experienced through their studies. But more importantly, the technology should be relevant for their further careers. Flexibility is also important. The students value the possibility of being able to work when it fits into their time schedule, and also to be able to work remotely. There will also be times when students will need to take a longer break from the project, such as during exams.

Keywords: student employment · software development · software engineering education · employment on campus

1 Introduction

Many students spend a considerably amount of time working alongside their studies. This may include work with no direct academic relevance to what they are studying, primarily carried out to provide a financial supplement to student

life and to get some general work experience. It can be workplaces such as grocery stores, training centers, different kinds of shops etc. Some students are able to obtain work that is of direct relevance for their education, which then adds an extra value to the work.

Academic institutions do also employ students. Often, but not always, this kind of work has a professional relevance for students. Tasks may be aimed at educational purposes or other purposes where students are assumed to have the competence to contribute. Some examples are guidance of students in exercise lessons, leading colloquium groups, develop laboratory equipment for teaching or research, mentoring students, carrying out recruitment work, etc. This type of work is considered as positive to list on the students' CVs, especially when they have no other relevant work experience.

One area in which we have seen little use of student employment, is for the development of software that academic institutions can benefit from. Students within Information Technology can be important contributors, and will at the same time gain relevant work experience. There could be several advantages in engaging students for such purposes, both for the students and for the institutions. Students may gain real life practice, increase their academic qualifications, earn money, and build self-confidence, while institutions can get valuable work done, build stronger connections to the practice field, and include students closer in academic work and research at the institution.

Educational institutions may create environments where IT students are given an opportunity to apply for software development jobs internally, which by students may be perceived as valuable for their education, personal development, and later professional practice. In this paper we investigate the student perspective regarding such kind of student employment. Students are interviewed to shed light on what is important when it comes to undertaking such work, and about what is considered as important in terms of follow-up and support during such work processes.

In Section 2, the background and aim of this research is further described and related to others work, in Section 3, the methods used for collecting data are described, in section 4, data is presented, in Section 5, the results are discussed, and in Section 6, the conclusions are presented.

2 Background

Working while being a student may be described as "the new normal" [3]. The report from Georgetown University suggests that 70 to 80 percent of college students in the US are both active in the labor market and formally enrolled in some form of post secondary education or training. When examining students who combine work with ongoing learning, they found that working and learning simultaneously has benefits, especially when students work in jobs related to what they study.

The normality of combining work and studies also applies to students in Europe. A recent report from EUROSTUDENT [6] report that almost 80 %

of the students in the EUROSTUDENT countries (a subset of 26 countries in Europe) combine studying with one or more paid jobs. Around 60 % of all students work during term time. According to the same report (Figure B6.1), 87% of Norwegian students work while studying - during the lecture free period, during the lecture period or both.

Work opportunities may be fostered by the educational institutions themselves. A recent comprehensive report [2] from NASPA (Student Affairs Administrators in Higher Education) describes three main focus areas for on-campus student employment (p. 7):

- **Academic enrichment** provides students with educational learning experiences that enable them to develop intellectually, build career-readiness skills, and access adequate instructional support.
- **Social engagement** ensures that students have access and opportunity to freely participate in diverse, educational, community-building activities outside of the classroom with peers, faculty, and staff.
- **Financial capability** helps students build the capacity to meet the financial demands of higher education.

The report also describes *the working student dilemma*. How much time and effort may a student invest in part time work without negatively impacting academic success? Earlier work suggests that a student may work somewhere between 16 to 26 hours a week before it negatively impacts academic performance [7, 9, 12, 13] (cited in [2]).

Describing how student work affects academic success, such as Grade Point Average (GPA) and retention, is not easy. As an example, Brint and Catwell [1] found that off-campus work showed a strong net association with lower grade point averages. But use of time that connect students to campus life showed relatively weak and inconsistent effects. Pike et al. [12], focusing on first-year students' employment, conclude that: *(...) working 20 hours or fewer on campus can be positively related to student success because it is related to greater levels of participation in active and collaborative learning activities and positive interactions between students and faculty members.*

In a recent review [11], investigating if student work affect educational outcomes, Neyt et al. write that (Chapter 1): *In general, that is when equally weighting all studies, we find that the effect of student work on educational outcomes is non-positive.* There will be variation in regard to type of studies and the level of education (tertiary/secondary). They argue that combining study and work is more adverse for students in tertiary education due to the more challenging nature of tertiary education.

The employment of students could be viewed in a larger context than GPA and retention. IOWA GROW[®] (Guided Reflection on Work) [5], developed at the University of Iowa, is an example of a framework for student on-campus employment. The framework includes structured learning-centered conversations between student employees and their supervisors. Students are not only employed to do a job while studying, but the job should be educational. Students are

given time and opportunity to reflect on how the work relates to their personal development and further careers.

The GROW[®] framework has been incorporated in student employment programs, such as Student Employment Experience (SEE) at Ohio State University. Halper et al. [4] investigated reflection on academic integration and all learning competencies in students employed in the student affairs division at the university. One group of students was in the SEE program, the other group was not. They concluded that *student employment could enhance student learning more broadly by fostering reflection on how academic experiences and employment experiences connect.*

Narrowing down to employment of IT students, Heggen and Myers [8] describe "The Student Software Development Program" at Berea College, Kentucky, USA, where students are hired to develop (or further develop) custom web applications for the institution. A survey among participating students revealed that they self reported a significant increase in their software engineering skills as a result of their participation. They also reported a confidence boost as a result of their part time work as a developer.

To the best of our knowledge, there is little or no empirical evidence on how students perceive an opportunity to work part-time on an on-campus software development project. What factors are important for them when considering whether or not to apply for such a job? This is our contribution - to investigate the following research question:

- **RQ:** What factors are important for students considering an on-campus, part-time job as a software developer?

An answer to the question will help educators setting up software development projects involving student hiring. It may help them attract candidates for the jobs, and it may also help them structure the project in a way that will keep the students satisfied throughout the project.

3 Method

Interviews were considered as the most suitable method for obtaining data that could answer our exploratory research questions. A structured interview guide was prepared, but with open-ended questions that were meant to encourage students to express themselves freely about the topics they were presented. The target group for selecting interviewees was students within a study that could be relevant for a part-time software development job at their educational institution.

Candidates were selected from 3 different geographical campuses. A total of 14 persons were interviewed in three group- and two individual interviews. Two persons were master's students, 11 were bachelor's students, and one had just finished his bachelor's degree. The individual interviews lasted for approximately 30 minutes, while the groups interviews lasted approximately 15 minutes longer.

In the introduction to the interviews, the students were informed about the purpose of the interview, that all participants would be anonymous, the

possibility to leave the interview at any time, and that notes would be taken during the interview. They were also explained the overall interview structure with open-ended questions. In the group interviews, the students were encouraged to talk among themselves as opposed to answer individual questions. This allowed one student to supplement input from other respondents, and to possibly uncover divergent opinions or consensus regarding a specific topic. With these open-ended questions, we were able to elicit information we had not thought of in advance.

The same interview guide was used both for the group interviews and the individual interviews. The form of these interviews was similar and correspondingly open in form. The interviews were conducted by three different educators, in an environment where the students could feel comfortable. The first interview, a group interview, was carried out with all three interviewers present in order to create a common understanding of how the interviews should be conducted.

After the interviews were conducted, all notes that were taken during the interviews were thoroughly read and the content then manually coded and organized, before analyzed in relation to our research question.

The target group for recruiting interviewees had a large majority of men in the three represented campuses. Although a gender balanced group of people was desired, we were not able to recruit women for the interviews. All 14 participants were therefore men.

4 Results

In this section, key information from interviews with students is summarized, based on what the respondents have highlighted as particularly important regarding recruitment and undertaking tasks as student developers in software projects initiated by their academic institution.

4.1 Career-relevant technology

The interviews started with an open-ended question regarding important factors when considering a part-time job as an on-campus software developer. The students started talking about technology. Some students found it valuable to be able to further develop skills they had acquired in their studies. A part-time job as a software developer could allow them to dive deeper into an interesting technology that they had already experienced. Others were not so worried about specific technologies, but rather what type of development was involved, such as front-end, back-end or full-stack. If approached with the possibility of being employed as a part time software developer, the type of work and choice of technology would be of high significance.

Some participants did not require that they already had experience in using the project specific technology. An even more important factor was that the technical aspects of the project were relevant for their future careers. If they see themselves working as a back-end developer in the future, they could be interested if they could do back-end work in the project. If they see React as a

Javascript framework of high relevance for their future career, they would like to be able to improve (or start learning) React through the project.

4.2 Clarification of expectations

Students do get an indication of how well they are performing through grades along their studies. But this will not automatically transfer into a conscious opinion of how they will be able to perform in real life software development projects. When considering a part-time developer job, they want to really understand what type of expectations they will be facing. What does it really mean to be able to work with a specific programming language? What does "experience with a specific technology" really mean? *I have some experience with React, but I don't know if I can say that I am able to use it.*

Within these expectations, the students want to know in advance if the project is regarded as development only, or if there is room (hours to use) for skill development and learning. Are the students expected to step right into development and implement features, or will they have dedicated time set aside for learning? If dedicated time for learning is clearly formulated, there will be less worries regarding their own skills and level of knowledge heading into the project.

In one of the group interviews, the students started talking about something they believed was quite normal within IT studies; that some of the really strong students suffer from *imposter syndrome*. Some students are regarded by their peers as excellent students who would do really well as software developers on practically any project. But these excellent students would not apply for such a job as they believe they would not handle it.

4.3 Flexibility

Another common topic occurring within the interviews was the need for flexibility. The students will appreciate the possibility of being able to structure their work to match other activities. This is especially important during exams. Students will need time off projects in hectic times. Some students could refer to turning down earlier job offers when flexibility was not well enough addressed.

Flexibility is also connected to the ability to work remotely. The majority of students we talked to appreciate the possibility of working remotely from home. Although some students emphasized the need to get to know each other on the developer team before they started to work remotely. Other students saw no big problem in getting to know each other online.

When talking about flexibility, the students also reflected upon the overall workload - how many hours during a semester would be reasonable to expect when working part-time as a software developer while studying? Most students considered it as okay to work 1–2 days a week alongside their studies, while some believed that a summer job was preferable. A summer job would make it easier to not let the work conflict with their studies. But working throughout the semester would make it easier to receive supervision.

4.4 Mentoring and supervision

As mentioned in chapter 4.2, students may be uncertain about their own skills and level of knowledge when it comes to participating in a real life software development project. This leads to a need for mentoring and supervision as part of the project. This is so important that the student considering such a job needs to know the level of support they will receive along the way. Will faculty staff be able to supervise? Are there experienced project participants already on board the project, who may act as mentors to new recruits?

Some participants regarded this as one of the possible core benefits of having a part time software development job *on campus*, as opposed to having a similar part time job externally. Educators might have a better understanding of the skill-set and level of knowledge the students possess when entering the project as they have broad knowledge about the studies involved. The educators will also, hopefully, have experience in supervising students. Although a thorough understanding of how supervision and mentoring would be handled in the project was seen as important for some students, the same students also realized that similar part time positions outside academia would also include supervision and mentoring.

4.5 Salary - and competition from other work alternatives

For some of the students, the amount of money involved was an important factor and they would start talking about it early in the interview. For some students, the topic had to be explicitly brought into the interview.

The students were asked how they perceived working as a student developer, compared to, for example, other kinds of jobs offered to students inside of academia, especially work as a student assistant. Student assistant is in this context primarily a student helping other students solving exercises during a scheduled time.

There was a clear perception among the respondents, both from those who have had such experience and those who had not, that working as a student assistant is perceived as easier and better paid than working as a software developer on an internal project. Working as a student assistant normally involves being available to answer questions from other students in defined and scheduled exercise hours. It is well adapted to the assistants own scheduled lessons, and it is carried out outside exam periods and study-free periods. Although the hourly salary as a student assistant is normally lower than the salary as a student developer, the salary as a student assistant is still overall considered as better. This is because paid preparation time is added to the supervision time and the work itself is perceived as easier.

Student assistants are normally paid 1 hour for preparation, in addition to an hour of supervising. A student who knows the subject well, will often spend less time than allocated to prepare for the lessons, and it can often be possible to work on other things in parallel. Through the work, the assistants also get a valuable refresher on previous material. The work also takes place at times when

the students are likely to be present on campus anyway. Admittedly, student assistants are also used for other types of work, where they get paid hourly, but then tasks are normally well-specified and of shorter duration, which makes it easy to plan for. Working as a student assistant in a subject is perceived as a clearly defined task, both in terms of work, time, and salary, and is thus considered easier to undertake than a developer job with many unknown factors.

It was pointed out by several that they could earn approximately NOK 100 more per hour in a job outside the institution than in jobs inside the institution and often also without the work requiring special skills. For jobs requiring some skills, employers often operated with salaries in line with the statistics provided by trade unions such as NITO and Tekna, which the students claimed was above what they would receive as student developers.

The students at University of Southeast Norway (USN) could also be engaged as SI leaders, instead of as more traditional student assistants. SI is an abbreviation for “Supplement Instruction”, a concept where senior students act as SI leaders in student peer groups arranged in *difficult* courses. Their mission is to facilitate learning through arranging colloquies and other activities, to improve students’ learning outcome. Lund University has described the method and its impact on dropout and graduation rates in a paper by Malm et. al. [10]. SI has in recent years been incorporated at USN.

Since SI leaders are not supposed to help students specifically with exercise solving, they are not paid an extra hour for academic preparations, such as student assistants normally are. Since SI leaders feel they need the same level of academic preparations, in addition to having a perception of a more demanding job situation, students often prefer to undertake the role as a student assistant, although SI leaders have a slightly higher rate of pay per hour.

4.6 What? When? How?

The interview guide included some topics that were not automatically brought up by the students, so the topics had to be introduced. Does it matter to the students *what* they will develop, *when* (at what stage in their studies) they will work, and *how* the project should be organized in regard to project management?

The actual application or system to be developed was of some importance (when the topic was brought up). It is considered motivating to work with a development project where the results are to be used openly and by many. It is less motivating to develop something that is only meant to be used internally in a research project or similar. Being able to say something like: "Look, I helped to develop this", i.e., something you can be proud of, is experienced as valuable.

The students agreed that taking on a part-time job as a software developer during the first year of a bachelor’s program would be too soon - unless the candidates have special competence prior to their studies. A good time to be involved in a project would be somewhere during the second year of the bachelor’s studies.

It should also be clarified how the development process is expected to be. Should there be a large requirement specification, where the students’ results

are presented in the final phase of the project, or is there a plan for an agile development process with follow-up, evaluations and adaptations along the way? But again, this was not something the students mentioned before it was explicitly brought up in the interview.

5 Discussion

When planning an on-campus software development project, including hiring of part time students as software developers, deciding what technologies to use is of high importance. Not only must the technologies be well suited to solve the problem at hand, but they should also be aligned with current industry standards. This will make the project more attractive to students. The same applies to development projects spanning over longer periods of time. The technologies involved must steadily be adjusted to keep up with what is happening in the industry. According to our findings, this industry relevance is more important than using technology that the students are familiar with through their studies.

Students considering a part-time work as a developer need a thorough clarification of expectations. Based on our findings, the average student will be unsure whether they have the necessary qualities to be able to contribute to a project. There will be students who lack the self-confidence they need to apply for such a job. This can also apply to students who, considered by their fellow students, are highly skilled. This is in line with Heggen and Myers [8] who described increased self-confidence as one of the main benefits the students reported from working on development projects for their educational institution. Many students need to build confidence and see that what they learn can actually be used in real projects.

This lack of confidence may also lead to using alternative ways of recruiting. Our findings suggest that there are students who are highly skilled and would never apply for an on-campus development project through the normal job advertisement board. It could be argued that these lost candidates would greatly benefit from having this type of job experiences, and they would likely do a good job. One alternative way of finding these candidates could be to talk to students and ask them to suggest possible candidates, who then could be encouraged to apply. Setting up (and describing) the project with mentoring, supervision and time included for learning and personal development would also help attracting students unsure if they should apply.

Salary is naturally a factor for students considering working as an on-campus developer. But our findings suggest that salary need not be the most important factor. As long as the project is set up with a clear room for personal development and learning, good follow-up, flexibility and career relevance, then the salary level can be at a moderate level. The job will still be attractive. But if these elements are not in place, the students will have other job options which may seem easier to handle, and which may give a higher hourly wage. In the NASPA report on on-campus student employment [2], involving a US survey where 244 institutions participated, only 14% of the respondents reported that their institution uses

a standard, fixed rate for all student employment. The large majority (86%) reported using hourly compensation rates that differed depending on different factors, such as level of required knowledge/skills, and previous work-related experience. What policy to choose is not for us to recommend, but recruiting software developers is just one of many job opportunities in our own institutions. Competing for students, and using salary as a main motivation factor, could lead to an unnecessary internal competition for student talent.

6 Conclusion

Our results from this work show that there are several factors to consider when setting up an on-campus software development project involving employment of students. Special consideration must be taken into the technology involved, and the students must get a clear understanding of what is expected of them. The project should not only focus on what the students should implement, but also how the students should have time to learn and develop throughout the project. Some special considerations could be taken to ensure that also students with unreasonable low self-esteem regarding software development will apply for the job.

References

1. Steven Brint and Allison M Cantwell. Undergraduate time use and academic outcomes: Results from the university of california undergraduate experience survey 2006. *Teachers college record*, 112(9):2441–2470, 2010.
2. Omari Burnside, Alexa Wesley, Alexis Wesaw, and Amelia Parnell. Employing student success: A comprehensive examination of on-campus student employment. *NASPA-Student Affairs Administrators in Higher Education*, 2019.
3. Anthony P Carnevale, Nicole Smith, Michelle Melton, Eric Price, et al. Learning while earning: The new normal. *Georgetown University Center on Education and the Workforce*, 2015.
4. Leah R Halper, Caleb A Craft, and Yang Shi. Expanding the student employment literature: Investigating the practice of reflection in on-campus student employment. *Journal of College Student Development*, 61(4):516–521, 2020.
5. Sarah L Hansen and Beth A Hoag. Promoting learning, career readiness, and leadership in student employment. *New directions for student leadership*, 2018(157):85–99, 2018.
6. K Hauschildt, C Gwosć, H Schirmer, and F Wartenbergh-Cras. Social and economic conditions of student life in europe, Aug 2021.
7. Catherine A Hawkins, Michael L Smith, Raymond C Hawkins, II, and Darlene Grant. The relationships among hours employed, perceived work interference, and grades as reported by undergraduate social work students. *Journal of Social Work Education*, 41(1):13–27, 2005.
8. Scott Heggen and Cody Myers. Hiring millennial students as software engineers: A study in developing self-confidence and marketable skills. In *Proceedings of the 2nd International Workshop on Software Engineering Education for Millennials*, SEEM '18, page 32–39, New York, NY, USA, 2018. Association for Computing Machinery.
9. Carol A Lundberg. The influence of time-limitations, faculty, and peer relationships on adult student learning: A causal model. *The Journal of Higher Education*, 74(6):665–688, 2003.
10. Joakim Malm, Leif Bryngfors, and Johan Fredriksson. Impact of supplemental instruction on dropout and graduation rates: an example from 5-year engineering programs. *Journal of Peer Learning*, 11(1):76–88, 2018.
11. Brecht Neyt, Eddy Omey, Dieter Verhaest, and Stijn Baert. Does student work really affect educational outcomes? a review of the literature. *Journal of Economic Surveys*, 33(3):896–921, 2019.
12. Gary R Pike, George D Kuh, and Ryan C Massa-McKinley. First-year students' employment, engagement, and academic achievement: Untangling the relationship between work and grades. *NASPA journal*, 45(4):560–582, 2008.
13. John Robert Warren. Reconsidering the relationship between student employment and academic outcomes: A new theory and better data. *Youth & Society*, 33(3):366–393, 2002.