Letter of Transmission

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March 24, 2022

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Dear Dr. Rensink,

This formal report includes the data collection and solution for recruiting programmers for the coding team of the Visual Cognition Lab at the University of British Columbia. Due to many developers leaving the lab with many experiments to be coded, there is an urgent need to hire more programmers. Throughout the research and experience gained while working in the research lab, a solution to the needs of researchers and effective methods to solve the issues, and the information could help the lab members. The data was collected with the help of members of the coding team at the Visual Cognition Lab at UBC. Although eight out of ten members responded to the survey, a larger sample size could further support the analysis. During the investigation, it became clear that immediate action is required to hire new programmers to conduct experiments for research and determine an effective method to retain the existing members. This report includes a solution to help researchers in your lab effectively and efficiently conduct research, and publish more research papers.

Please consider this formal report to recruit new programmers and maintain the existing members.

Sincerely,

Jake Moh

Jake Moh

Analysis and Recommendation of Recruitment of Programmers at the Visual Cognition Lab

for

Professor Dr. Erika Paterson

ENGL 301 Instructor

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Vancouver, British Columbia

by

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Mar 30, 2022

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Abstract

The researchers at the Visual Cognition Lab at the University of British Columbia depend on data collected through online experiments through a web browser. The experiments are required to be coded by the programmers of the coding team. However, with many programmers leaving the lab, many experiments are waiting to be coded and researchers are experiencing delays in conducting research. This formal report uses surveys and interviews to investigate the issues and provide potential solutions to the problem. Data is collected on the following topics: current needs of the researchers, qualification of applicants, recruitment process, and duration of work. Through the analysis of the data, there is a need to recruit additional programmers who show interest, are experienced and know about the technology used in the projects. Furthermore, a recruitment advertisement is most effective using email at the start of the term. As a recommendation, it is advised to recruit programmers through a paid position to increase the duration of work.

Introduction

Background

The Visual Cognition Lab is a vision science lab in the Psychology Department of the University of British Columbia operated by Dr. Ronald A. Rensink as the principal investigator. The lab is interested in investigating visual intelligence, and how the human visual system uses the light entering the eyes to create a variety of perceptual experiences. The researchers are interested in exploring the mechanisms that carry this out and the ways this knowledge can help with the design of effective visual displays. The lab has multiple projects owned by different groups of people with most projects using software programs to conduct experiments. Therefore, researchers must have a basic understanding of programming to effectively develop new experiments and modify the existing ones. Once the experiment is made, participants are collected to experiment on the computer located inside an isolated room. The experiment usually consists of participants choosing one of two similar but different pictures in sequence. After the participants have completed the experiment, the experiment is saved on an online database where researchers retrieve the data to analyze the result. The analysis of the data is then used to support the researcher's hypothesis and publish research papers.

Problem

Although most researchers have a good understanding of the experiment objective, design, specification, and basic programming knowledge, they often need better knowledge and experience in coding to implement complicated experiments. Also, the researcher's main attention and time are dedicated to reading research papers, discussing with other researchers, conducting research, and coming up with a novel research proposal for the next experiment. Previously there were programmers in the lab who specifically worked on coding the experiments for researchers but many of the members either left after graduation or left due to other important matters. This resulted in the coding team being short-staffed with multiple experiments required to be coded.

Scope

This report aims to provide data and solutions to the problem by answering the following questions:

1. How many experiments are required to be coded?
2. How many additional programmers are needed?
3. What project needs more programmers?
4. What is the most desired skill for new programmers joining the lab?

5. What technology should new hires know?
6. How did the current members hear about the programming position at VCL?
7. When did the current members hear about the programming position at VCL?
8. How long are the current members planning to stay? Why?
9. Why did the current programmers join the lab?
10. What can motivate programmers to stay for longer?

Method & Solution

To determine the answers to the questions of the scope, a survey is used as the primary source of data collection while an interview is used as the secondary source. According to the survey, it is evident that there is an urgent need to hire new programmers with experience and technical skills. Furthermore, the best method for hiring new programmers is by email followed by word of mouth. From the interview, many programmers have joined the lab to gain experience in programming and are planning to volunteer for approximately one to two terms. As a solution, a recruitment method is constructed and a possible recommendation is determined to retain programmers in the lab for a longer duration. This formal research report will be addressed to Dr. Ronald A. Rensin, the principal investor of the Visual Cognition Lab.

Data Collection

The request for the survey was given to ten lab members during the weekly coding team meeting at Visual Cognition Lab with a brief explanation of what the survey entails. The lab members of the coding team consist of seven programmers and three researchers who are either undergraduates or alumni who graduated within six months. Eight people responded to the survey within a week. The survey is composed of three major parts: 1) Current needs, 2) Qualifications of applicants, and 3) Recruitment process. The result of the survey is displayed by histograms, pie charts, and quantitative data. Furthermore, a possible solution to retain existing programmers for a longer duration is determined by interviewing two existing programmers.

Current Needs

Number of Backlog Experiments

Throughout weekly lab meetings, there were frequent issues brought up by the researchers regarding the delay of experiment deployment due to unimplemented experiments. To precisely determine the number of experiments required to be implemented, a further investigation is required and was invested by a survey question asking “how many experiments are required to be coded?” (**Figure1**). From the data

collected, only one participant responded that there is only one backlog experiment to be coded. Three participants responded there are three experiments to be coded and four participants responded that four or more experiments are waiting to be coded. This raises a significant issue since conducting experiments is the main portion of the research. This further explains the frustration the researchers expressed during weekly team meetings. When asked about the current situation about the need for programmers during an interview, researchers have expressed the need for management to hire more programmers. They also mentioned that existing programmers are given excessive responsibilities and expressed their concerns. This calls for an action to hire new programmers to code the experiments.

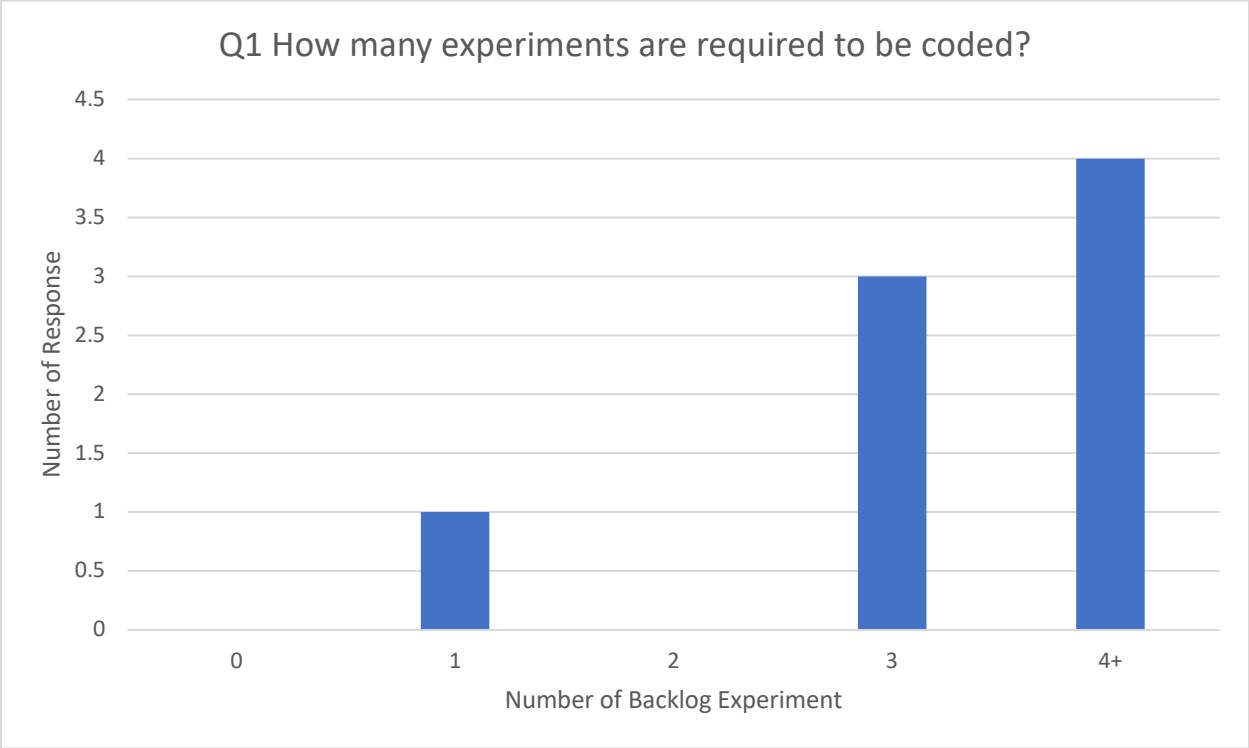

Figure 1: Histogram of the survey question “How many experiments are required to be coded?”

Number of Additional Programmers

Currently, there are only seven programmers in the lab with only three active members. The lack of active programmers has caused many projects to be delayed since the summer of 2021. According to **Figure 2**, two participants responded that three additional programmers are required in the coding team while six participants responded that four or more additional programmers are required in the team. When the survey was conducted, it was expected that most people will answer in the range of one to four but most participants answered four or more. A more insightful question can be developed if the question is asked about a number instead of multiple questions to determine the upper bound of the additional programmers required. According to the interview, participants have mentioned that increasing the number of programmers is important but the skill and experience of the programmers are equally important. This result from the survey and interview further supports the need for new programmers at Visual Cognition Lab.

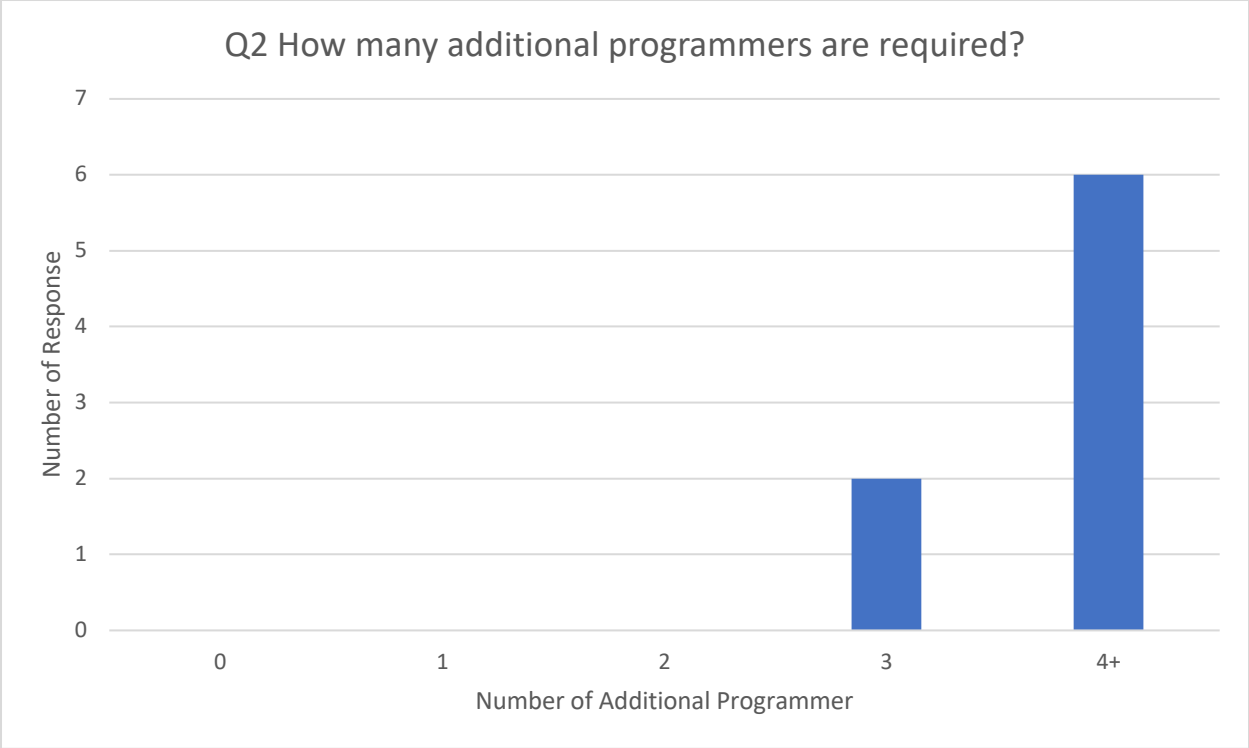

Figure 2: Histogram of the survey question “How many additional programmers are required?”

Project of Higher Priority

There are two general projects worked on by the coding team: content platform web application and experiment web application. The content platform web application is focused on developing a website that displays the timeline of experiment development and a brief introduction to all the ongoing projects in the lab. On the other hand, the experiment web application is used to conduct experiments online to gather data for researchers to analyze. The content platform project has two active

programmers while the experiment project only has one. The other programmers who are not active are either onboarding or are not participating in programming regularly. Between the two programs, the experiment web application takes a higher priority since researchers are dependent on the experiments coded by the programmers. In contrast, the content platform web application does not have a strict deadline since it is not directly used for research but can greatly help lab members to keep track of their work and is used to introduce different projects to both other lab members in different teams and people unassociated with the lab. According to the survey, 75% (6) of the participants said experiment web application takes on priority while 25% (2) of the participants said content platform web application should take precedence (**Figure 3**). However, it is important to note that at least two researchers have participated in the survey and most likely selected the experiment web application instead of the content platform web application. When hiring programmers, we can assign 75% of the programmers to the experiment project and the other 25% to the content platform project.

Figure 3: Pie chart of the survey question “What project needs more programmers?”

Qualifications of Applicants

Desired Skill

To recruit qualified programmers, it is important to determine which skills are relevant and important when working as a programmer in the coding team. As seen in **Figure 4**, 50% (4) of participants responded that interest is the most desired skill when recruiting new programmers, 38% (3) of participants responded that behavioural skill is

most important, and 12% (1) of participants responded that technical skills are most important. This was an unexpected result since the position is technical and requires programming knowledge. Most people responded that interest is most important because most of the positions are volunteer positions that have low expectations, obligations, and responsibilities. Therefore, the new recruitment should be self-motivated and is interested in either research or programming. Furthermore, behavioural skill is an essential part when working in our lab because there are frequent communications between the researchers and the programmers. The lab members stated that the ability to work in a team is a crucial skill and programmers must coordinate and communicate effectively to produce a desirable outcome that everyone could agree on. Through the interview, a participant mentioned that technical skills can be learned while working on tasks and taking computer science courses but interest and behavioural skills are relatively harder to develop over time. Therefore, based on the response to the survey and interview question, it is clear that we should look for applicants with strong interest and behavioural skills with technical skills as desired skills.

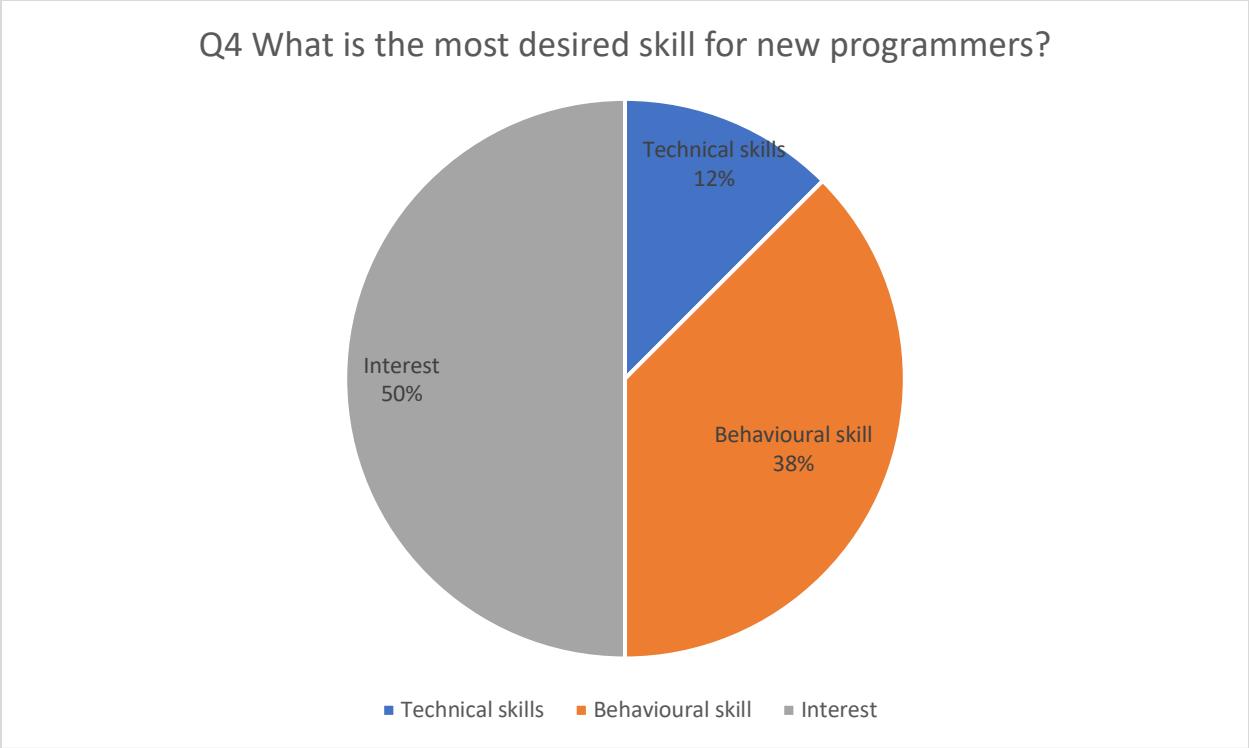

Figure 4: Pie chart of the survey question “What is the most desired skill for new programmers?”

Technology

Determining the technologies that the applications are familiar with can be used to select qualified programmers. Both of the projects are mainly built using JavaScript, HTML, CSS, and use Git as version control while the content platform project uses React as its frontend technology. As displayed in **Figure 5**, all of the eight participants responded JavaScript and Git are requirements, seven responded that HTML is a

requirement, six responded that new hires need to know CSS, only one responded python, and two participants responded D3 as a requirement. When constructing the advertisement, we can state JavaScript and Git as a requirement technology and HTML, CSS, Python, and D3 as desired technology. The recruiter is recommended to ask for a resume to determine if the application has sufficient experience in the technologies.

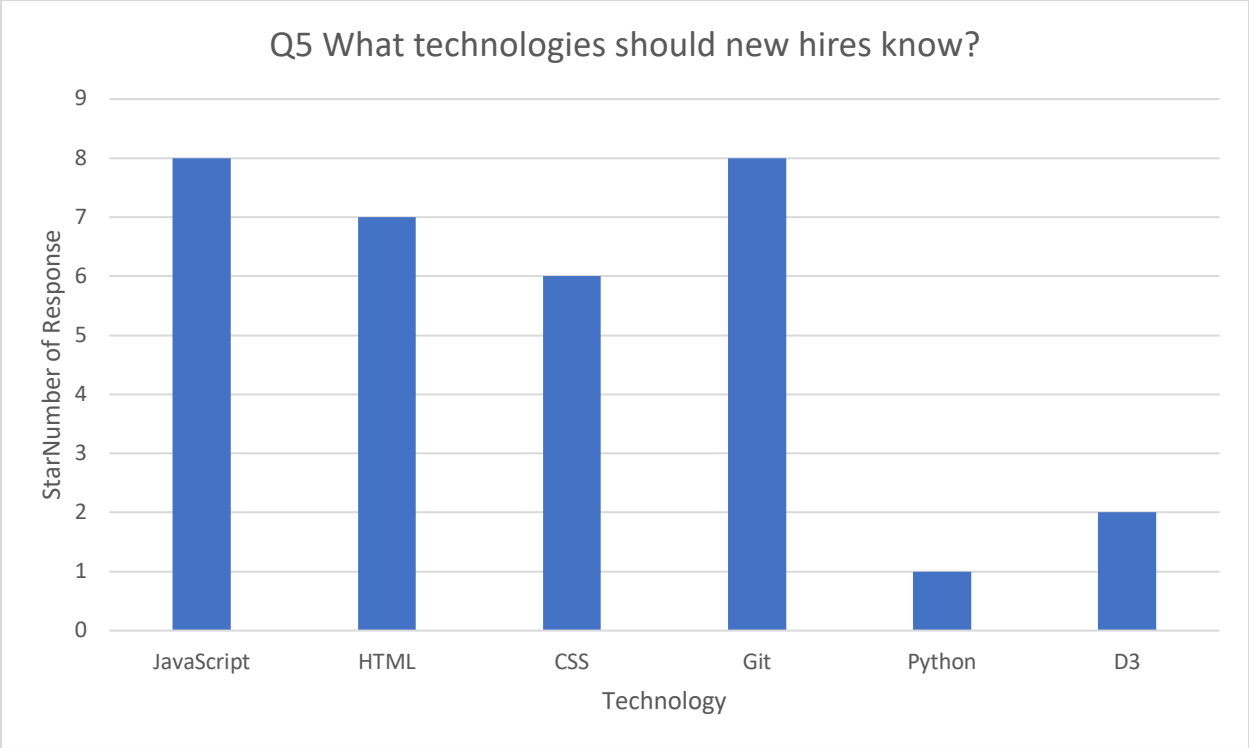

Figure 5: Histogram of the survey question “What technologies should new hire know?”

Years of Experience and Number of Programming Courses Taken

According to the survey, for a qualified applicant, the average year of experience was 0.25 and the average number of programming courses taken was 2.5. Considering that inexperienced programmers are likely to struggle to contribute to the current codebase, our lab prefers programmers with basic background knowledge and experience in computer science. Therefore, we should target students who are at least in the second year when recruiting if possible.

Recruitment Process

Method of Advertisement

Once we determined the need for recruiting programmers and the desired qualifications of the applicants, we must determine the effective recruitment method. As shown in **Figure 6**, five out of eight participants heard about their current position through school email, one participant found it through the Visual Cognition Lab main website, and two participants heard about the position through word of mouth. Also,

during the interview, a participant mentioned using a bulletin board in the computer science building could be useful. Therefore, when constructing advertisements, we should utilize school email while also encouraging lab members to refer people to the lab.

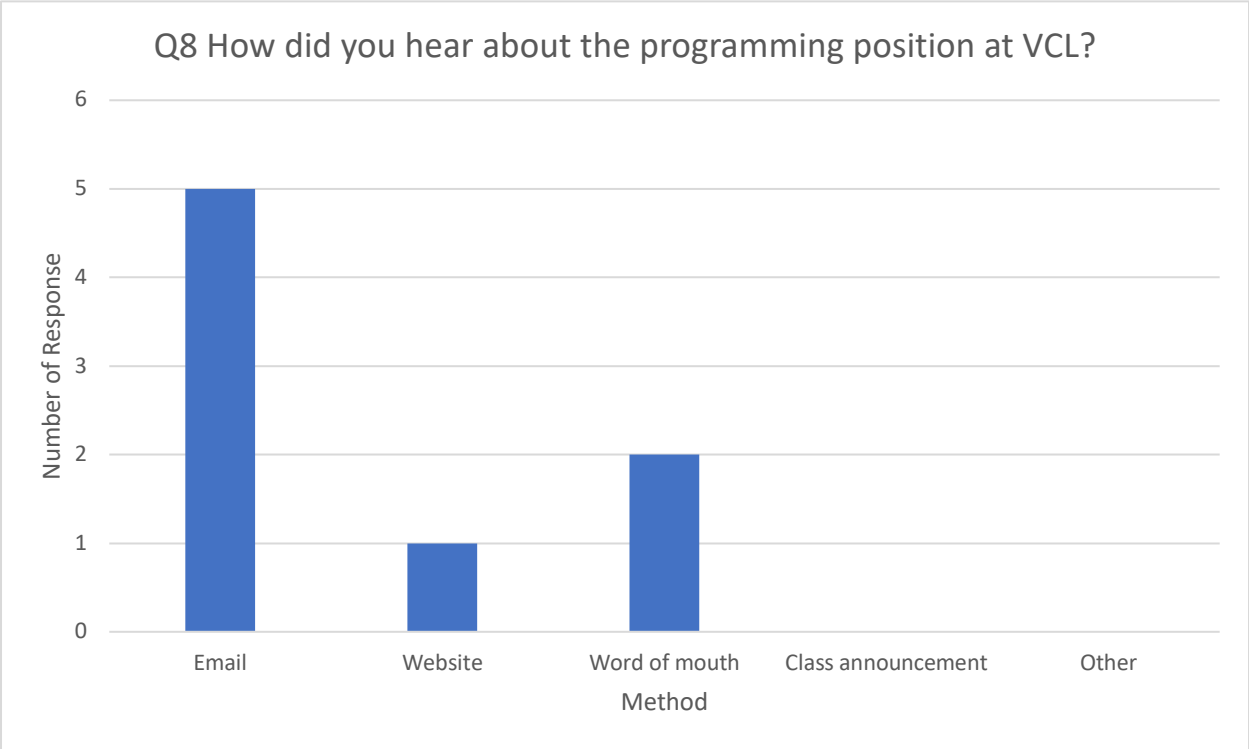

Figure 6: Histogram of the survey question “How did you hear about the programming position at VCL?”

Time of Recruitment

The time of recruitment should also be considered to effectively hire new programmers. Based on **Figure 7**, five participants responded that they applied to their

current position at the start of the term while one person applied in the middle of the term, one at end of the term, and one between terms. This is most likely because students are busy during the middle and end of the term, and do not frequently check school emails. Also, students are less stressed and burnt out during the start of the term and therefore, are more likely to find other opportunities outside of school. It was expected that many participants applied between the terms when it is less busy but had only one response. Therefore, recruitment should be done during the start of the term to increase the chance of recruiting qualified applicants.

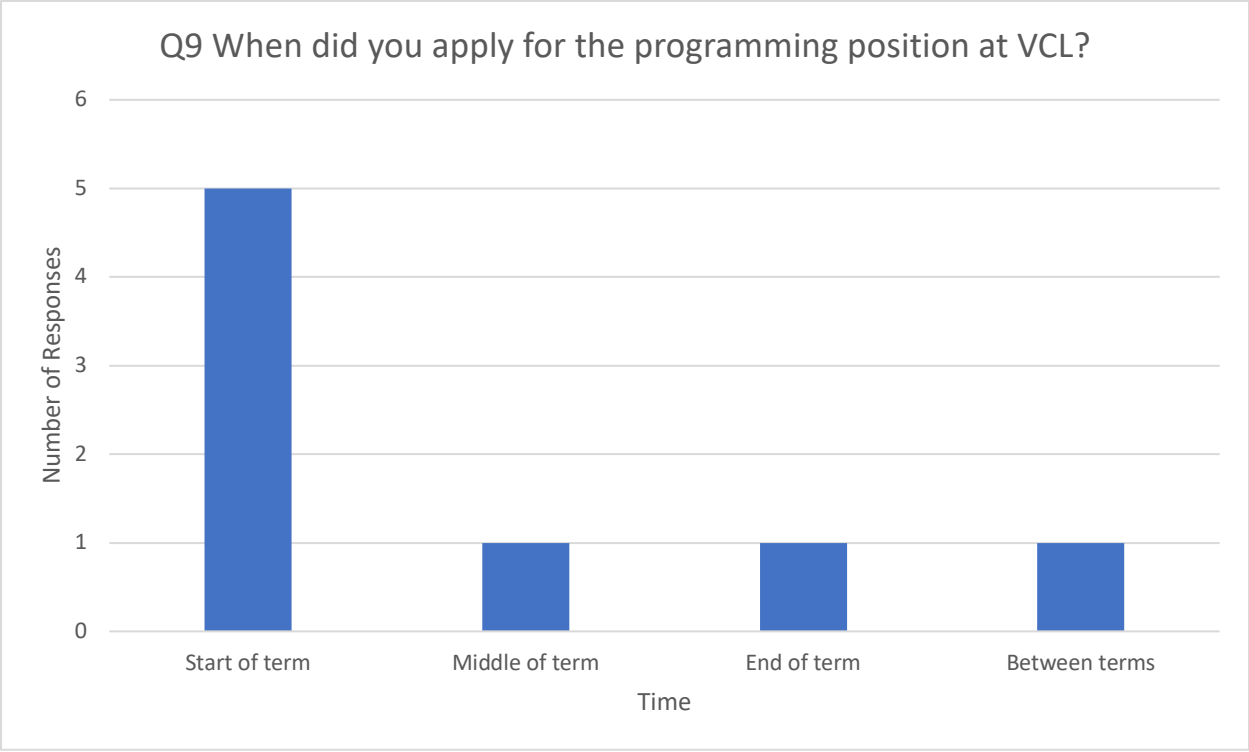

Figure 7: Histogram of the survey question “When did you apply to the programming position at VCL?”

Duration of Work

Intention

During the interview, the lab members were asked what their intentions are to volunteer as programmers in the coding team of the Visual Cognition Lab. One programmer who has been in the lab for three months responded that he volunteered to gain programming experience and be involved in research in an undergraduate program. He also said he is satisfied with the experience so far and wants to invest more time in programming but has been hard due to the heavy course load. Another programmer said she wanted to gain programming skills and work on a project outside of school but also struggled to find time to work on the projects due to schoolwork. She also said she is considering leaving the lab since she thinks she will be busier next term.

Duration

An interview was conducted to determine the intended duration of volunteering as a programmer in the coding team. One programmer said he does not know exactly

how long he is planning to stay but said he is willing to stay for more than two more terms since he has projects he wants to complete. However, the other programmer said she is considering leaving the lab after this term since she feels overwhelmed with school and feels bad for not contributing enough. When asked if they would be more motivated if they are financially compensated for their work, they both answered that they are willing to stay since the pay can help finance their tuition, rent, and food.

Recommendation

Based on the result of the survey and the interview, it is recommended to send an email advertisement at the start of the term that looks for programmers who show interest in working in the lab and have technical knowledge in JavaScript and Git. It is recommended to hire at least four programmers and assign 75% of the new hire to the experiment web application project. Furthermore, to increase the length of the programmer in the coding team, the lab managers should consider paying the programmers if possible. If only a few programmers can be paid, the coding team manager and lead programmer for each team should be compensated since they are more critical members of the team.

Conclusion

This formal report proposes a solution to the demand for programmers in the Visual Cognition Lab at UBC. It is recommended to compensate the programmer to hire qualified applicants and retain the existing programmers. Also, the report explains the need for programmers, what characteristics qualified applicants should hold, and the methods of recruitment. Although the process of interviewing is yet unclear, this formal report provides the groundwork to recruit qualified programmers to assist in developing research experiments.

Appendix

Survey Questions

Link: https://ubc.ca1.qualtrics.com/jfe/form/SV_dccrDiptqPIvORw

Q1 How many experiments are required to be coded?

- 0
- 1
- 2
- 3
- 4+

Q2 How many additional programmers are required?

- 0
- 1
- 2

- 3
- 4+

Q3 What project needs more programmers?

- Experiment
- Content platform

Q4 What is the most desired skill for new programmers?

- Interest
- Behavioural skill
- Technical skill

Q5 What technologies should new hires know?

- JavaScript
- HTML
- CSS
- Git
- Python
- D3

Q6 How many years of experience should new hires have?

Q7 How many programming courses should new hires have taken?

Q8 How did you hear about the programming position at VCL?

- Email
- Website
- Word of mouth
- Class announcement
- Other

Q9 When did you apply for the programming position at VCL?

- Start of term
- Middle of term
- End of term
- Between terms

Interview Questions

- Do you think we need more programmers? Why?
- How many additional programmers do we need?
- How could we effectively advertise the programming position?
- What skill or characteristic do you want new hires to have?

- What is your intention for joining the coding team at Visual Cognition Lab?
- How long do you plan to stay?

Work Cited

“About.” *UBC Visual Cognition Lab*, https://viscoglab.psych.ubc.ca/about/.

“Home Page: UBC Visual Cognition Lab.” *Home Page | UBC Visual Cognition Lab*, https://viscoglab.psych.ubc.ca/.