Culminating Reflection Project

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Author Note

This thesis alternative project is submitted as partial fulfillment of a Bachelor's degree of Computer Science at Kettering University. All written conclusions discussed in this thesis project are my own and do not reflect any opinions of Kettering University or any others that may have contributed to this thesis.

Despite the lack of representation of other's opinions and experiences, I would like to greatly thank everyone that has committed time to allowing this thesis to happen. Without them, this project would not have been successful.

1. Dr. Michael Farmer, Department Head and Professor of Computer Science at Kettering University.
2. My Mom and Dad, without their support throughout the years I would not be where I am today.

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Introduction

My name is Colin Quinn and I am a Computer Science student at Kettering University. Originally starting at a community college, I transferred to Kettering half way through my second year, where I have worked to finish my Bachelor's of Science through Kettering University's Computer Science department. Throughout my time at Kettering, I held two co-op positions. My first being a software validation position at LG Electronics in Troy, MI. While working for LG, I tested the infotainment systems for the new upcoming releases of vehicles through Ford and Toyota. The second and longer lasting co-op experience I had was for Tome Software in Royal Oak, MI as a software developer co-op. At Tome, I assisted in development throughout different projects with a vast majority of time being spent on a location sharing and communication system. During each of these experiences, I found myself gravitating toward cyber security in my free time and as such have specialized my degree to reflect that interest. Current career plans are also related to these experiences as I would like to pursue a software development or engineering position with the possibility of obtaining my master's degree once I find an accurate and enjoyable niche in my career. All of my experiences throughout my time at Kettering have assisted me toward becoming not just a better student and employee, but also gave me the chances to grow into the person I am today. The first experience that I want to discuss is the difference in my two co-op experiences. While one was significantly more enjoyable than the other, both have taught me many valuable things that I plan to continue applying to my career and personal life. Between these experiences I have learned that a career is important but so is a healthy social circle and once both are balanced, the best work will be produced. In addition to this, I have gained experience working with numerous technologies in creating a quality solution. The second topic of becoming a resident advisor in Thompson Hall

and the major influence on my communication and work ethic. In order to work with people, it is better to understand different situations and how personal experiences may have affected the outcomes in each new scenario. On top of that is learning the ability to manage many different responsibilities at once while still maintaining a higher quality of work in all areas. These skills do not come easy, with time and practice however, they are essential to managing all of the stresses that come in career and life. As the last topic, I would like to talk about the vast amount of collaboration throughout the student body at Kettering University and how forming a goal driven social group can greatly influence your experiences. Forming study groups that work efficiently not only aid in overall test performance, but also build the connections that will help in creation of high quality social circles. These groups can often allow for working relatively close to something you may be familiar with, but enables an environment to learn more techniques and skills for creating a better product.

Conclusions and Recommendations

In conclusion, I feel very safe in saying that I would not be the same person that I am today without my experiences at Kettering University. It has always been a personal goal of mine to continue growing in all aspects of life and Kettering has allowed for much more than that. Honing in on social skills, managing multiple tasks, being able to take a leadership role when necessary, and prioritizing both personal and career goals if either tend to fall behind are just some of the lessons I have learned through Kettering. Kettering is well focused on academics, but that only scratches the surface of the lessons to be learned while taking classes and working at co-op.

My recommendations to anyone that is interested in participating at Kettering University would be to fully embrace the things going on around you. There are so many opportunities and groups that are available that will help you both academically and socially. Participating with others and contributing what you have to offer is going to greatly improve your experience and personal growth during your time at Kettering. It is much easier to find the things that you truly enjoy when you are actively seeking out new opportunities and doing so will put you drastically ahead of those that do not. Hobbies are also a great recommendation to help take your mind off of classes every once in a while. With as many similar minded people that are at Kettering, it is very likely that you will be able to find someone that is interested in your similar hobbies.

Project Description and Learning Outcomes

The first experience from Kettering University that I would like to discuss is the co-op system. When describing my experience at Kettering, the co-op oriented design of the schedule is oftentimes the most drastic difference for those who are used to a more traditional style of schooling. My personal co-op experience has been quite positive, despite not enjoying my first job at all. The first co-op that I had was working for LG Electronics in Troy, MI. While working for LG, my assignment was to be assisting in infotainment validation and reporting any errors that had occurred during testing. However upon arriving at the office, it had quickly become clear that the organization was not great as I had not even gotten access to my email throughout the first week. After reading numerous documents based on what I was to be doing, it had seemed like there was not enough work for me to do, and that amount even decreased drastically as I learned more about testing the vehicle systems. A few weeks into working for the term, I had finally gotten my first actual assignment aside from reading documentation, which was to test the current vehicle system for a rare issue upon startup. The tasks for the assignment usually consisted of one to two hours of work per day for a few weeks, and unfortunately, that is all of the work that had been assigned to me during my twelve weeks of work. Asking for more things to do throughout the day came to no avail as well, which led to teaching myself python programming out of boredom and doing some random applications that I thought would be fun to make.

That following term of classes I started the job hunt once again and had a few offers to choose from, which thankfully led me to my long-term co-op at Tome Software in Royal Oak, MI. Tome, being a small company focused on software consulting around hobbyists and their safety. My first term there was very enjoyable as I was on a few different projects and getting

used to software development tools and best practices. I had gotten the experience of kicking off a project with Ford and learning the tasks involved with making sure that things are in line to operate as smoothly as possible. The following terms I was placed to assist on development of one of their larger projects. While learning more about the development process, I continued to complete tasks from the development backlog, test the current hardware and software, and contribute any opinions in meetings whether it be for the specific project or office-wide. In performing these tasks, my confidence in completing tasks relating to programming in C, Kotlin, Python, and Bash has grown exponentially. I gained experience working with many new tools such as Segger, Android Studio, Docker, linting configurations, and common management systems like Github using a modified Gitflow workflow described in Atlassian (2021). Between completing tasks, having conversations with other coworkers, and learning the numerous tools needed to complete the job, there was very minimal down time which led to a very fulfilling experience.

The differences in these experiences also went far more than socially learning things about a good and bad workplace. My experience with LG Electronics kept me in relatively familiar positions in working with Microsoft Excel, data crunching, and following step by step guides. While some technical knowledge was gained about things like CAN bus protocols and general information about how infotainment and GPS tracking works within vehicles, it left much to be desired for my intended career path of software engineering. Tome however, delivered incredibly well on showing many industry standards. As stated prior, almost everything I was working on had some sort of new technology, tool system, or process that I had to learn about in order to succeed. Whether it be a new programming language such as Kotlin and Bash, or a relatively familiar one like C or Python, any task came along with a learning curve. The

same goes for tools like Docker, Github, Jira, Segger, Android Studio, Visual Studio Code, etc… New standards had to also be learned in order to contribute meaningful work to the team, and information from other team members and documentation styles like described by Beams (2021). Some tools got far more attention such as Github and Jira due to them being the industry standard for numerous version control and simultaneous workflows, while the development tools and IDE's shared their time of use. While separating so many tasks into different categories within software engineering, I may not have gained a ton of experience with a specific toolset, but rather I have gained the ability to think creatively, use information available to me, and generate a viable solution. As a result of these experiences, I am very confident in my ability to form a solution that can work for the company and customer. Someone who is proficient in what they do understands not only the how and why of what they do, but is also open to learning new ways of performing similar tasks and that has been one of the largest tangible skills I have learned throughout my time at Kettering.

The reason that I wanted to discuss this is because despite one experience being drastically more enjoyable than the other, they have both taught me very important things. The lessons from LG being that with working for a large company, there will likely be many oversights. One of the major reasons I had originally accepted the job offer there was because it was a very recognizable company and my assumption was that it would be a good experience as well as the pay being better than other offers I had received. In hindsight, I should have not accepted the larger amount of money and went for a better experience, especially so early in my career. Focusing on learning and investing in yourself early will grant a much larger return on investment than simply taking the easy way through. As it became apparent when working with Tome, experience is one the best ways to become better, and not being afraid to fail something a

few times is exponentially more valuable than not trying in the first place. There is always something to learn and one of the best ways to continue doing so is to surround yourself with people who think differently or have more experience than you do. With those lessons, I plan to continue challenging myself and others around me to try to reach the next level.

The second experience at Kettering that I would like to discuss is adjusting to balancing class work and being a resident assistant in Thompson Hall. This job had some rather difficult requirements as a lot of the ways to make it easier were things that I had never really thought of before or constantly changed throughout the weeks. It consisted of a lot of community building events like a weekly program that myself and the other resident advisors fully planned, group activities that were used to create a sense of community within our individual halls, and making sure that everything in the building was functioning as intended. Included in these responsibilities were weekly meetings, constant relaying of information and advertising things happening around campus, organizing opening and closing so that all residents could move in and out of the building as smoothly as possible, nightly rounds where we would walk through the building to either socialize with residents or make sure that all of the residents were safe and nothing was broken. Being able to maintain many different levels of socialization to meet the needs of the residents often proved to be quite difficult, especially on top of managing class work and personal social circles.

The reasons I wanted to talk about these experiences are to show that despite the stresses that come along with balancing many separate responsibilities, there are numerous lessons to be learned when these opportunities come along. Time management is one of the largest lessons found here, and while it can always be improved, it is something that everyone who is successful at Kettering learns. Being able to manage what could sometimes feel like a full time work

schedule on top of having classes led to some stressful and very beneficial times. Especially as finals would come around and people would have many questions since the final exams and move out were both within the same days. This led to many questions answered, times having to be blocked out of schedules for studying, making sure everyone could get out of the building, and that I was able to make it to my final exams, which have all strengthened my ability to estimate how long a task will take me. This translates incredibly well into all aspects of life as it allows me to accurately schedule any meetings and plan others accordingly.

The final experience that has helped me greatly is collaboration on studying and projects. As with most students, homework and studying is usually where most of the time is spent and without having the proper resources can often feel like a time sinkhole. This is where creating a high quality social group can be of great use. There have been numerous exams that would have taken exponentially longer to study for were it not for having familiar classmates. Some of the best examples I can think of was studying for a matrix algebra final exam where a study room had a quarter of the class all working on problems together. Similarly, filling the whiteboard walls of a D-Space with practice problems for both discrete math and theory of computation. Or similarly working on group projects such as pair programming assignments in operating systems or creating an entire software system with numerous others for software engineering. These collaborations are one of the strongest friendship builders amongst classmates, in conjunction with the smaller class sizes and community found at Kettering, they can often lead to great future collaborations as well.

As these groups are beneficial to create social networks, they also greatly increase understanding of topics. As a specific example, the overall project within Software Engineering fits incredibly well. As some background, the project was to design a sales management and

inventory system, with a front end for user interactions and a backend to store the current inventory and tasks for the shop. This was to be completed including all of the pre planning we had done as well as producing the actual systems according to our design. Having a well balanced group that is able to complete different aspects of the assignment is incredibly beneficial. In my case, the group had someone that is very front-end design oriented, two others had experience creating databases and interfacing with them, and I have experience with version control and software sharing techniques as well as some project management. Having a diverse team allowed for us to quickly get our parts done independently and ultimately bring each part together into a working system. Allowing each of us to work in areas we are generally familiar with but still need to expand our knowledge a bit, led to a positive experience for all involved. With being in charge of compiling everyone's separate pieces through Github and using Trello as our task board, I was able to not only complete my tasks assigned, but also help keep others on track. In doing so, I feel very confident in my ability to not only help organize a new project, but continually contribute to the physical code, discussion, and design choices that will be implemented.

The main reason I wanted to discuss this is to emphasize the impact that others can have on your education. Having a reliable friend that is also learning alongside you can do many things such as offer alternative thought processes, entirely different ideas, and ask questions that you may not have thought of. This can be very closely associated with rubber ducky theory (Debugging, 2002). This theory is that verbally explaining a problem or process can drastically increase the likelihood that you will find any logical errors within it. This increases greatly when it is being discussed with someone with the ability to ask questions. Not only does this process increase your comprehension, it is also great practice for your career. You will very often find

yourself having to ask specific questions to people who may not understand what information you are really trying to extract. Being able to form a question in multiple ways is an invaluable skill that is learned most from collaboration with peers. In addition to these skills, close collaboration has helped form incredible friendships. Working with others can often be tricky, but after forming a good rapport with classmates and coworkers it quickly becomes one of the most enjoyable parts of Kettering. I have found that maintaining these social groups through both classes and work terms allows for a mutual understanding that most people have similar goals. We all want the people around us to succeed and will often go out of our way to ensure that happens.

In conclusion, all of these experiences have shaped me into the person I am today. The abilities that I have learned and practiced during my time at Kettering have allowed me to not only become a better student and employee, but also become a better person and acquaintance. Whether it be managing stress levels, honing in on learning techniques, or simply having a conversation with others, Kettering allows for practice in all of the areas needed to be successful.

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