Executive Brief

Michael Surdek

Southern New Hampshire University

IT 697: Python Experiential Learning Activity

Dr. Bhanu Kapoor

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**THE EXPERIENCE**

This experiential learning activity served as an introduction to the python programming language for the purpose of analyzing data as well as an exploration of basic tools, strategies, and challenges of computer programming in general. My experience can retroactively be broken into three stages: a beginning, a middle, and end. The first four weeks were spent developing an understanding of the command line interface, interactive development environments, python syntax, objects and libraries, and how to build simple programs. The middle three weeks functioned as a chance to grow my novice understanding through studying analytical techniques in python such as importing, cleaning, wrangling, aggregating, and visualizing data. The final three weeks have consisted of putting together everything I had learned into a data visualization project and wrapping up the course by documenting my experience in the Executive Brief and the Certificate of Completion.

I chose to pursue this opportunity with the aspiration of acquiring skills that might increase the value that I can bring to the table in a future career as a data analyst. I had participated in the SQL experiential learning activity last semester, so I understood the potential benefit of dedicating 10 weeks strictly to learning a new programming language. Coming into this experience, I was at the beginning of the interview process for a data analytics co-op with Insulet Corporation, a company that manufactures medical devices. I am now expecting to start this role in the next couple months and I hope that it might lead to a full time position, at Insulet or elsewhere, after I’ve completed the MS Data Analytics program. According to what I have gathered through the application process, the data analytics team tracks real-time manufacturing data and builds dashboards for the manufacturing team using Tibco Spotfire visualization software. The data that they track is, however, too large and complex to be productionized right away, which is where python programming comes into play. The analytics team uses python to transform the real-time data into a version that allows the dashboards to runs as quickly and accurately as possible. This experience, for me, was mainly a crash course to get up to speed in python at the level where I can be competent in the co-op role. With that being said, I now more than ever understand the importance of python in any data analyst role, and I think it will be companion of mine in future positions beyond the co-op itself. For this reason, I undertook this experiential learning activity knowing that it will benefit my professional career for years to come.

**APPLICATIONS OF THEORIES AND PROGRAM COMPETENCIES**

All graduate courses, including this experiential learning activity, expose students to theories and concepts that are at the forefront of today’s world. With these theories and concepts in mind, students can develop competencies which prepare them to face any challenges that they might find in business using strategies and methods that have proven to be effective.

Throughout the process of learning python in this experience, the themes that appeared repeatedly were problem solving, the drive to learn and the initiative to practice, exposure to new tools and technologies, and communicating well with others. In fact, while interviewing for a data analytics co-op position, I was told that, besides technical and mathematical skills, these qualities are exactly what they look for in potential candidates. Along with the weekly guidelines and course requirements, the activities that I spent most of the time on during this experience have been based on these concepts, each of which has helped provide the framework for developing some of the ideal competencies of the MS Data Analytics program.

The ability to understand and solve complex problems is one of the most important outcomes of the Data Analytics program. To be able to solve problems using data, one must not only grasp the scenario and what exactly is being asked of them, but also must be in tune with the information available to them as well as their own arsenal of tools. The activity that demonstrates this the most in my learning experience was developing solutions to the practice assignment scripts posted in the module overview most weeks of the experience. These assignments included problems such as counting sentences in a file, calculating a factorial, and drawing a Koch Curve. Two aspects of using programming to solve problems that I routinely encountered were grasping what exactly a question is asking and developing solutions for individual situations vs solutions that scale to more complex scenarios. Both of these aspects need to be considered by programmers on a regular basis. This experience was the first time I was required to make these considerations, and I believe that doing so strengthened my data analytics program competency of problem solving.

Another activity I worked on that demonstrates the Data Analytics program competency of adapting and implementing innovative methods, models, and technologies is my data visualization project shown in the outcome matrix below. Once I had figured out how to write and run python code, and then developed my understanding of analyzing and visualizing data, I felt comfortable trying my hand at a visualization project. I found a data set of individual season statistics from the last 10 years on the PGA Tour and found an interesting relationship that has changed in professional golf over the last decade. I used a Jupyter Notebook and the matplotlib module to create subplots that compare how certain statistics led to Tour wins in 2010 and 2018. To accomplish all of this, I had to combine some background knowledge of mine with new tools and techniques that I had just recently learned about. Although the end result is nothing original nor exceptional in any way, I am satisfied considering just two short months ago I knew nothing about python programming.

Finally, a third MS Data Analytics program competency of communicating with professionalism, accuracy, and transparency was best applied through each course’s weekly discussion threads. The experiential learning activity is different in many ways from a standard course, but fortunately there still existed the opportunity to share and discuss with my peers on a regular basis. The discussion page is a helpful aspect of these online courses because it is not only an opportunity to share my thoughts and the work that I have done, but also to hear ideas and see projects from many of my peers who are making interesting and unique posts and comments. These comments can point out something about my work that I did not notice. They can show me something that could be improved or where I could have been more clear. A lot of comments even pose a question that I had not considered and allow me to go further into my analysis. Every week with a discussion page is a tremendous opportunity to apply the program competency of effective communication.

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| --- | --- | --- | --- |
| **Outcome #** | **Description** | **Explanation** | **Screenshots** |
| **MS.DAT.07** | Adapt and implement innovative methods, models, and technologies that allow for adaptability to new and unexpected changes and improve the agility of data analytics projects | Created a chart using python that shows how a higher Driving Accuracy used to lead to more wins on the PGA Tour in 2010 than Driving Distance, but the reverse is true in 2018. |  |

**DISTINCTIONS**

The experiential learning activities that I participated in for the last two semesters have been unlike any other courses I have ever taken. In most courses, you are handed specific learning resources, assignments with standard grading criteria and rubrics, and evaluations such as tests and projects. This learning experience, on the other hand, provided a few resources and a assignments to serve as starting points, but the rest was left up to me. There was much more freedom in this experiential learning activity, and that freedom came with additional responsibilities. For example, when I was relatively familiar with a weekly topic such as reading data from files, I would have been able to easily complete the assignments and move onto the next week in a typical course. However, in this experience, the onus was on me to review what I already knew and to take my learning to the next step with additional resources and practice. The main difference is that instead of being assessed on how much information I could gather and retain, the only thing that mattered was what I put the effort into learning and how I could relate it back to my overall journey, goals, and aspirations.

The significance of the distinctions between this course and most others is most evident in the fact that the experiential learning activity is more similar to my overall learning journey and experience as a professional. In the real world, you are not handed every bit of information that you will need for a project and there is no place that is a one-stop shop for all the directions and answers. Instead, you must combine what you already know with the limited resources you already have in order to determine what your next step will be. Occasionally in this experience, I felt somewhat lost at the beginning of the week. This is quite normal at the beginning and at various stages of real-world projects. I was not exactly sure where to start, but this experience has shown me that I just needed to search for new resources and let them guide my discovery.

**FUTURE DIRECTION**

In the Executive Brief of my SQL experience, I wrote that, given another chance, there are some things I would have approached differently. I discussed the importance of getting started early in the week to stay ahead of the weekly pace and my desire to improve the articulation of my thoughts and ideas by incorporating more citations in my discussion posts and reflection journals. I certainly did a better job of these things this time around. It was easier to stay ahead of schedule with my activities each week due to the fact that I was not enrolled in a second course. The best thing to come out of this improvement was finishing up my reflection journals at a time other than the last possible moment before midnight on Sunday. That was a regular occurrence in the SQL experience, but this time I was typically better able to enjoy my Sunday evenings by finishing my activities at a more reasonable hour. I also followed through with my plan to include at least one citation in my discussion posts. I found that it not only improved the quality of my posts, but it made the writing process even easier once I found a reference around which my post could be tailored.

There is still one thing that I would approach differently if I were able to do-over the experiential learning activities, and that would be to base the experience around a long term project on a topic or data set that I found interesting. I got a taste of this with my PGA Tour visualization project, but that only took parts of a few days. A long term project was not necessarily reasonable in my two experiences, because I had no prior knowledge of SQL and python at the beginning. But in a hypothetical world where I could start this experience again with my current knowledge, I would spend less time reading books and watching videos and more time gaining direct experience with the tools and techniques themselves. This type of experience can be much more valuable. In fact, I realized how much of a difference it can make when I was working on my small project. The entire time I was looking things up on google and in the books that I had read earlier in the experience. By doing this, I was discovering the exact solutions to the problems I was facing, instead of learning the general concepts that make up the entire range of things I might face. This is the type of experience that is most similar to programming work in the real world, and it is what I would like to emulate if I had another chance at these experiential learning activities.

I accomplished most of what I had planned for this experience, but there were some things that I never got around to completing. In the beginning, I hoped to finish the two books that were my main resources throughout this experience, Python for Data Analytics by Wes McKinney and Learn Python the Hard Way by Zed Shaw. I was able to use a large portion of both books as they related to the specific things I was trying to learn each week, but I still have left a few chapters of the former and more than half of the exercises in the latter. As I move beyond this experience, I still plan to complete these books, as I believe they are excellent resources which will provide benefits for me as I begin my data analytics career. In particular, Python for Data Analytics seems to be a book that I will be able to reference just about any time I am working with data in python. I already did exactly that with my visualization project, and it will only become more useful as I face more complicated tasks and challenges in my career.

My experience in learning python was directly related to other courses I have taken in my academic program. Each connection I find provides a deeper understanding of what it will take to accomplish my goals of becoming a data analyst. The data analytics program is largely based around the R programming language, which is used for many of the same things as python. I entered the course with what I would consider to be slightly above a beginner’s level of understanding in R and this provided many benefits on my python learning journey. I was much better able to understand programming and analytical concepts in python when I had seen them before in R. People like to debate which of these languages is better in general and particularly for learning first. Now that I have explored python in this experience, my stance is that learning anything about one language will make you better at both of them. In fact, I have reason to believe that I am now better at R than I was nine weeks ago, even though I have only programmed in python in that time. Both R and python are essential skills for data analysts at many companies, and without this experience I would be lacking a critical requirement for the jobs that I see myself in someday.

I hope that what I have learned through this experience and my academic program as a whole will continue to benefit me in future professional opportunities. I aspire to use data analytics to guide business strategies and decisions. It is easy and sometimes impressive to use flashy and pseudo-scientific methods to accomplish this, but these are often not very sound and will almost always eventually produce poor results. It is important for a data professional to be both well-versed in technique and diligent in research and effort. This opportunity has not only provided me with python skills that will improve my technical abilities, but it has also shown me how to effectively solve problems, maintain a drive for learning, explore new tools and technologies, and communicate well with others.

References

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