End of Module Assessment 2: Individual Reflection

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Introduction

The structure of this reflective piece will follow the Rolfe et al (2001) reflective model, a framework that focuses on three questions about an event or context: What? So What? Now What? (See Figure 1). Briefly, 'What' refers to what happened, 'So What' involves interpreting the information and deciding how one can use it and take forward into the 'Now What' stage which focuses on learning from the experience.
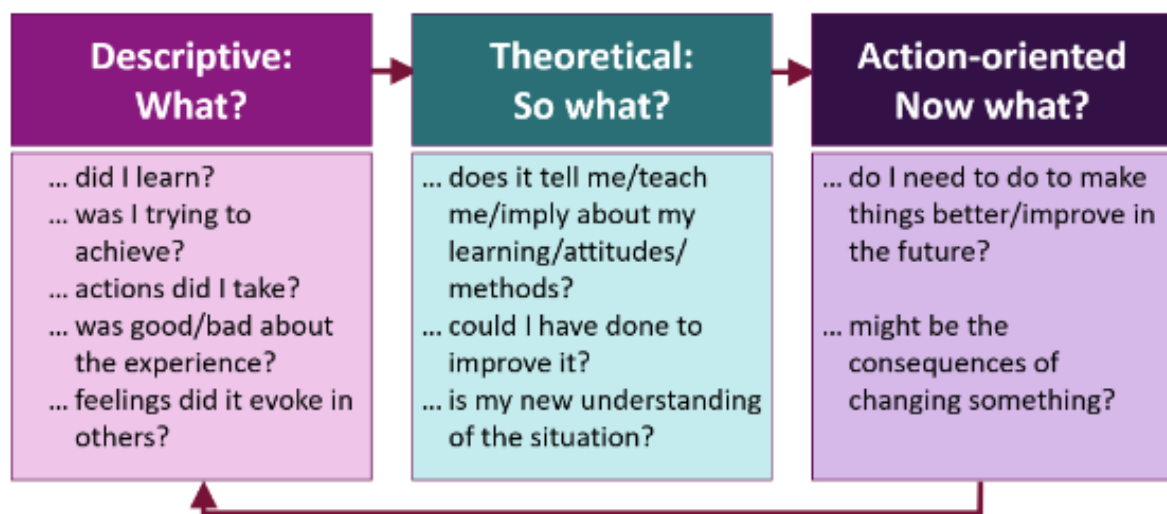

Figure 1: Rolfe et al.(2001) Reflective Model

The Numeric Analysis module aimed to introduce me to the key aspects of statistics that would be required in data science and artificial intelligence. The learning objectives were centred around learning to use the statistical software R Studio and the programme language R. Moving this understanding forwards, further objectives were around using these tools to develop the ability to critically evaluate and perform a range of mathematical and statistical methodologies. I am reflecting on this module primarily to evaluate my own learning, explore the challenges I overcame, and reflect on the growth in data analysis and statistical knowledge I have cultivated.

What?

The key activities I undertook in this module involved learning R and how to use it to conduct statistical analyses, interpret data and results, and create tables and plots. Units 1-3 introduced the basics of R and the foundations of understanding and managing data. Units 4 and 5 took this further and looked at descriptive statistics, producing plots and basic calculus. Units 6-12 built on this foundation by covering a range of statistical methods including confidence intervals, significance levels and p-values, parametric/nonparametric tests, correlations and regressions.

My initial expectations were of concern, because I felt rather daunted by the task of learning mathematics again. Most adults haven't studied mathematics since they were in school, and I am no different. To be honest, I felt insecure in my abilities (Hart et al, 2019). However, going through the module material in sequence and attempting supplementary exercises together with the module reading material, I began to steadily understand more and gain more confidence. My actual learning experience was such that I found maths enjoyable, especially when I could see how understanding maths could be applied practically to real-world problems (Sekarwinahyu et al, 2019).

So What?

I faced a number of challenges during this module. These were centred around learning R as a language and getting to grips with the commands. Any new language is a challenge, and I am not a computer engineer by training. Coming into this course, I had no baseline coding knowledge. But with any new skill, practice makes perfect, and coding is no different (Chang et al, 2024). I kept trying things out on R Studio and checking my code with online references and video tutorials, as well as course materials on the online learning portal.

Interrogating the data and being comfortable with selecting the most appropriate statistical analysis methods was a crucial step on my learning journey (Abdi et al 2023). I tried to pay specific attention to the role of descriptive statistics and normality testing, and then understanding how these can signal which tests may be best to use for certain data and tasks whilst understanding the assumptions one must consider. Interpreting statistical findings was the next important step. I tried to focus on core skills such as learning the role of p-values and confidence intervals, and how these concepts worked together to help me understand data better.

Facing these challenges made me feel scared at the beginning, but rather quickly, I began to feel excited because I could see in myself growing in ability to handle and process data with mathematics. I was spurred on by the feeling of using this solid understanding of mathematics and statistics to inform how I can design AI systems to solve actual real-world problems (Roh et al, 2019). Of course there were some moments of frustration, like when R kept returning errors or learning how to handle missing/incomplete data. But there were moments of insight and achievement also, like when I completed specific weekly activities with increasing ease and confidence. I enjoyed learning from peers and the literature, and consulting these sources of knowledge to overcome obstacles felt rewarding as I deepened my understanding of the subject matter.

Now What?

I can identify within me new skills and knowledge, specifically around using R to understand, process, analyses and interpret data. I feel proud of some of my artefacts I created working autonomously in a self-directed manner. I feel a sense of self-efficacy emerging as I see my ability to successfully apply this knowledge to specific situations (Bandura et al, 1977). Conducting successful statistical analysis in R has contributed to this feeling. A real magic moment for me was when I used my newfound knowledge and confidence with R and data to perform some analysis for

research projects I conduct as part of my job as an Academic Neurosurgeon. Seeing how this learning could help actual patients and their families was a tremendous joy (Scott et al, 2014). I think for me, my future learning goals are now about taking this knowledge forward and applying it further to the real-world. Here, the understanding gets solidified and new meaning is derived because of the satisfaction one feels over mastering a challenging topic (Guskey et al, 2010). I'm not there yet, but this is where I hope to get to soon (Ramachandran et al, 2020).

Conclusion

My key learnings from this module are centred around how even as an adult, you can learn mathematics and feel joy doing it. My approach to data analysis has completely changed from fear and misunderstanding to competence and confidence. This module has had a significant impact in preparing me for future challenge and opportunities in developing, designing, and deploying AI systems. I now completely realise that AI systems can only be good as the data they are based on, and the underlying statistical models they are employing. I believe this is an essential trait of a good AI scientist, engineer, developer and consumer.

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