Unit 12 - Reflection:

This reflection explores my learning journey in the module “Research Methods and Professional Practice” of my Master’s degree in Data Science at the University of Essex Online. While previous modules required some level of critical engagement, this module pushed me to adopt a deeper, more analytical approach to academic research. Through tasks such as ethical analysis, comparative study evaluation, a literature review, and a research proposal presentation, I gained greater confidence in navigating complex methodological decisions. I also strengthened my understanding of research ethics, the structure of academic inquiry, and the importance of methodological rigor. Additionally, the module helped me identify and improve my time management strategies, especially in balancing academic deadlines with a demanding full-time job. These experiences have laid a solid foundation for my upcoming master’s thesis and will continue to shape my approach to research in professional contexts.

Although previous modules required critical evaluation, this module significantly deepened my critical approach to research. Early on, I analysed ethical responsibilities in using Generative AI and compared study and questionnaire designs, aligning with data science's growing focus on ethics and methodological rigor (Mittelstadt, 2019). During the literature review and research proposal presentation, I moved beyond summarising literature to identifying gaps, contradictions, and methodological flaws, in line with academic best practices (Snyder, 2019; Baako, Alhassan and Gidisu, 2022). My earlier work was mainly descriptive, but this module taught me to evaluate research designs and findings critically, highlighting strengths, limitations, and scholarly context. This shift reflects a

move from surface to deep learning (Desierto et al., 2018). My e-Portfolio shows clear improvement in critical thinking. For example, my initial literature review lacked consistent referencing, especially in the conclusion. Feedback prompted me to enhance my referencing and critical engagement in later work, notably the well-received research proposal. This iterative feedback process supports reflective learning and growth (Henderson et al., 2018). The module also strengthened my ability to address ethical dimensions of research, a growing priority in data science, especially as machine learning applications increasingly intersect with sensitive societal issues (Morley et al., 2020). I am now better prepared to assess both the technical and societal implications of research, skills that will shape my master's thesis and future professional work. This capacity to think critically and ethically will be crucial in navigating complex, real-world data challenges where clear-cut answers are rare and thoughtful analysis is essential (Leighton, Cui and Cutumisu, 2021).

Another key takeaway from this module was managing tight deadlines (Sayari, Jalagat and Dalluay, 2016; Vaida and Brinzei, 2021). Compared to previous modules, the workload was significantly higher, with numerous formative tasks for the final e-Portfolio and more demanding summative assignments. The literature review and research proposal presentation, each referencing over 40 academic sources, required extensive research and preparation. Balancing this with my full-time role in technology consulting was challenging, especially as deadlines approached. Feedback on the literature review suggested better time management would improve quality (Smith, 2019), which I applied to the research proposal. Starting earlier, I allocated two hours after work and four hours each day on weekends, allowing me to finish early and proofread thoroughly. This strategy proved effective and offers a

framework for balancing my job with the upcoming master's thesis. It also helps maintain a healthy work-life balance, preventing conflicts between professional, academic, and personal responsibilities (Schmidt and Hansson, 2018; Borowiec and Drygas, 2022). Moreover, this experience helped me develop transferable project management skills such as prioritising tasks, planning in advance, and managing cognitive load that will benefit both academic work and real-world data science projects (Kearney, Bond-Barnard and Chugh, 2024). These improvements have increased my confidence in handling complex deliverables under pressure and provided a clear roadmap for managing future research-intensive tasks.

This module gave me a foundational, practical understanding of research design, which I had not previously developed. In Unit 3, I critically analysed the research designs of two studies with similar questions, deepening my appreciation for the trade-offs in methodological choices and the importance of aligning design with objectives (Saunders, Lewis and Thornhill, 2023). In Unit 10, I created a research proposal on using machine learning for sentiment analysis, developing a framework that included research questions, methodology, and evaluation metrics. This was a major step beyond my prior experience, which was limited to conducting an extended literature review in my bachelor's thesis and following prescribed designs in earlier modules. Initially, I felt overwhelmed by the open-ended nature of this task and noticed anxiety which is common among novice researchers, especially in interdisciplinary areas like data science (Apostolidis and Tsiatsos, 2021). However, structured readings and iterative literature reviews helped ease this feeling. Readings like Creswell and Creswell (2018) clarified key principles such as operationalising variables, ensuring validity and reliability, and selecting suitable methods. This

grounding enabled me to design my proposal systematically and confidently. A key insight was the importance of methodological rigor. For example, I found studies using machine learning for sentiment analysis that lacked performance evaluation, such as omitting cross-validation which undermines credibility (Sarker, 2021). This helped sharpen my ability to assess research quality, both technically and in terms of scientific integrity (Leek and Peng, 2015). Overall, designing my own research has given me transferable skills for my master's thesis and beyond. I now understand how thorough planning and justification can turn a daunting project into manageable steps (Saunders et al., 2019).

In conclusion, the module "Research Methods and Professional Practice" has been pivotal in advancing both my academic and professional capabilities. I moved from a primarily descriptive understanding of research to a more critical, evaluative mindset that recognises the significance of ethical responsibility, methodological soundness, and scholarly contribution. The process of developing a research proposal from scratch, informed by structured readings and ongoing feedback, helped transform a previously overwhelming task into an achievable and rewarding challenge. I also learned to manage time more effectively, balancing academic and professional obligations without compromising quality. These lessons extend beyond the classroom, equipping me with essential skills for my master's thesis and future roles in data science. Ultimately, this module has shifted my approach from procedural to reflective, enabling deeper engagement with both research and practice.

List of References:

Apostolidis, H. and Tsiatsos, T. (2021) 'Exploring anxiety awareness during academic science examinations', *PLOS One* 16(12). Available at: https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0261167

Baako, I., Alhassan, H. and Gidisu, P. (2022) 'Understanding and spotting research gaps through a systematic literature review', *International Journal of Research and Innovation in Social Science* 6(3), pp. 549-554. Available at: https://ideas.repec.org/a/bcp/journl/v6y2022i3p549-554.html

Borowiec, A. A. and Drygas, W. (2022) 'Work–Life Balance and Mental and Physical Health among Warsaw Specialists, Managers and Entrepreneurs', *International Journal of Environmental Research and Public Health* 20(1). Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC9819779/

Desierto, A., De Maio, C., O'Rourke, J. and Sharp, S. (2018) 'Deep or Surface? The learning approaches of enabling students in an Australian public university', *STARS Conference*. Available at: https://www.researchgate.net/publication/353837764_Deep_or_Surface_The_learning_approaches_of_enabling_students_in_an_Australian_public_university

Creswell, J. W. and Creswell, J. D. (2018) Research design : qualitative, quantitative, and mixed methods approaches. SAGE Publications.

Henderson, M., Boud, D., Molloy, E., Dawson, P., Phillips, M., Ryan, T. and Mahoney, P. (2018) Feedback for Learning: Closing the Assessment Loop. Canberra: Department of Education and Training.

Kearney, J., Bond-Barnard, T. and Chugh, R. (2024) 'Soft skills and learning methods for 21st-century project management: a review', *International Journal of Information Systems and Project Management* 12(4), pp. 5-20. Available at: https://www.researchgate.net/publication/384694530_Soft_skills_and_learning_methods_for_21st-century_project_management_a_review

Leek, J. T. and Peng, R. D. (2015) 'Reproducible research can still be wrong: Adopting a prevention approach', *Proceedings of the National Academy of Sciences* 112(6), pp. 1645-1646. Available at: https://www.pnas.org/doi/10.1073/pnas.1421412111

Leighton, J. P., Cui, Y. and Cutumisu, M. (2021) 'Key Information Processes for Thinking Critically in Data-Rich Environments', *Frontiers in Education* 6. Available at: https://www.frontiersin.org/journals/education/articles/10.3389/feduc.2021.561847/full

Mittelstadt, B. (2019) 'Principles alone cannot guarantee ethical AI', *Nature Machine Intelligence* 1, pp. 501-507. Available at: https://www.nature.com/articles/s42256-019-0114-4

Morley, J., Floridi, L., Kinsey, L. and Elhalal, A. (2020) 'From What to How: An Initial Review of Publicly Available AI Ethics Tools, Methods and Research to Translate Principles into Practices', *Science and Engineering Ethics* 26, pp. 2141-2168. Available at: https://link.springer.com/article/10.1007/s11948-019-00165-5

Sarker, I. H. (2021) 'Machine Learning: Algorithms, Real-World Applications and Research Directions', *SN Computer Science* 2(3). Available at: https://pubmed.ncbi.nlm.nih.gov/33778771/

Saunders, M. N. K., Lewis, P., and Thornhill, A. (2023) Research Methods for Business Students. 9th ed. Pearson Education.

Sayari, K., Jalagat, R. and Dalluay, V. (2016) 'Assessing the Relationship of Time Management and Academic Performance of the Business Students in Al-Zahra College for Women', *European Business & Management* 3(1). Available at: https://www.sciencepublishinggroup.com/article/10.11648/j.ebm.20170301.11

Schmidt, M. and Hansson, E. (2018) 'Doctoral students' well-being: a literature review', *International Journal of Qualitative Studies on Health and Well-being* 13(1). Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6095025/

Smith, A. P. (2019) ‘Student Workload, Wellbeing and Academic Attainment’, *Communications in Computer and Information Science*, pp. 35-47. Available at: https://www.researchgate.net/publication/336377310_Student_Workload_Wellbeing_and_Academic_Attainment

Snyder, H. (2019) ‘Literature review as a research methodology: An overview and guidelines’, *Journal of Business Research* 104, pp. 333-339. Available at: https://www.sciencedirect.com/science/article/pii/S0148296319304564

Vaida, S. and Brinzei, L. (2021) ‘Time Management and Study Skills Guide for Improving Academic Performance’, *Revista De Psihologie* 67(3), pp. 275–284. Available at: https://journalofpsychology.ro/index.php/RP/article/view/48