Research Proposal

University of York

COM00150M

Assessing the Level of Social Acceptance for Artificial Intelligence (AI) in the Education Sector.

Total Word Count = 2992

Table of Contents

| 1 Introduction | 2 |
| --- | --- |
| 2 Literature Review | 2 |
| 2.1 Overview | 2 |
| 2.2 Education Policy | 3 |
| 2.3 Drawbacks | 3 |
| 2.4 Benefits | 4 |
| 2.5 Balance | 4 |
| 2.6 Ethics | 5 |
| 3 Research Methodology | 5 |
| 3.1 Philosophical Approach | 5 |
| 3.2 Methodology | 6 |
| 4 Project Management | 7 |
| 4.1 Aims and Objectives | 7 |
| 4.2 Risks and Limitations | 8 |
| 5 Ethical Implications | 9 |
| Reference List | 10 |

# 

Table of Figures

| Figure One - Gantt Chart | 8 |
| --- | --- |

# 

1 Introduction

Artificial Intelligence (AI) has swiftly infiltrated numerous sectors including the education sector. This research proposal’s field of study is therefore technology in the education sector. A multitude of platforms and applications have been rapidly introduced, from intelligent tutoring systems to automated grading tools [1], and AI promises to revolutionise learning. However, acceptance of such technologies hinges on teachers' perceptions of its effectiveness and impact on learning outcomes. This is a suitable topic for the Individual Research Project (IRP) because understanding how teachers perceive AI will influence how successfully AI is adapted into classrooms.

The research objective is to evaluate the level of AI acceptance amongst teachers with the unit of analysis identified as teachers in secondary education. This study will employ a cross-sectional survey to capture the data of one hundred teachers from more than one school in order to acquire a breadth of views. Significantly, this will allow for the analysis of teachers’ views across different schools.

It is hypothesised that teachers will demonstrate a high level of AI acceptance (measured as seven out of ten in a survey) for tasks which assist with administration, compared to AI which could be perceived as changing their teaching role and interaction with students. However, acceptance levels might vary based on a teacher’s subject specification or years of experience. This hypothesis is testable through the use of a survey to capture data but is falsifiable as results may indicate that AI is highly accepted in all areas, different areas or none at all.

The primary research question is: What is the level of social acceptance for AI within the education sector? In order to provide focus for this research the following questions will guide this research: To what extent do teachers perceive AI as a valuable tool for learning? What are the perceived benefits and drawbacks associated with AI integration? Are there concerns of job displacement due to AI? Are there concerns regarding ethics in AI?

2 Literature Review

2.1 Overview

AI has gone through stages of growth and contractions since the 1950s with AI enthusiasm being a constant for what it will deliver. Indeed, the Gartner Hype Curve presents a series of steps which delineate the evolution, adoption and social acceptance of new technology [2]. An example of AI enthusiasm in education is from an influential British educator, claiming in 2017 that teachers will be replaced with robots by 2027 [3] and [4]. Critically, this demonstrates how the use of AI in education can cause alarm among teachers. A counterclaim is provided in [5]’s study, an education report for UNESCO, that past digital technologies alone have not improved learning, addressed inequalities or reduced teacher’s workloads. Pointedly, this is strong evidence to suggest AI is promising in theory but past augmentation of technology in the education sector has under-delivered.

2.2 Education Policy

Government approaches and attitudes towards AI can indicate future intentions. For example, [6] emphatically states that AI is not going away and is already impacting the education sector. This gives impetus for the research objective in evaluating how socially accepted AI is by teachers. Significantly, [7], a Government white paper, used a survey with open-ended questions to gauge the use of generative AI in education to identify its benefits. But, from the 567 responses only 234 were from secondary education with 77 from STEM subjects. This indicates response bias as subject specialists may not accurately represent the broad experience for the wider teacher population. Moreover, a dominance of expert opinion could restrict the ability to generalise findings. Indeed, results show a positive response towards the use of AI but [7] was an open response study and arguably, resulted in respondents with a positive perspective.

The Government’s Education Hub blog also highlights how AI will reduce teachers workload [8]. Although, this statement should be viewed with caution as [9] argues against technology’s benefits for teachers. [9] conducted semi-structured interviews with 70 school Principals about the impact of email on teachers' workloads. A strength of this methodology is in the stage one data analysis, using the Constant Comparative Analysis method. However, stage two re-analysed data to fit predetermined codes based on a literature review which strongly indicates confirmation bias. That being said, results indicate technology in education may not always mitigate workload which is a similar conclusion to [5]’s argument. Indeed, teacher’s perception of new technologies may be viewed with scepticism, with reluctance to adopt it, based on negative past experience of technological uptake for work reduction. Making this an area for further research which aligns with the research objective and aims.

2.3 Drawbacks

Adoption of new technology can bring drawbacks for stakeholders. [10]’s research argues that greater use of AI would have a negative impact on students and is already causing anxiety for teachers. This paper is based philosophically in Marxist Alienation Theory which is criticised for standardising experience and lacking empirical evidence [11]. That being said, [10] highlights a feeling of anxiety over the impact of AI in the education sector. Work by [12] compounds the feelings of anxiety in [10]’s findings and argues that the role of both teacher and student change with AI as teachers become learning facilitators. However, this study only evaluates two AI models for assisting students with foreign language acquisition and arguably can not be generalised across all subjects. Importantly, this highlights a research gap for understanding how teachers perceive the impact of AI in their job role.

2.4 Benefits

Highlighting the benefits of AI in education [13]’s hypothesis suggests that the more technology is used the greater a teacher's humanity becomes a more critical aspect of their job role. This study focuses on the justification of teachers in the classroom but does not address teacher’s concerns of their role changing or how AI-human synergy can be harnessed, which is a research gap that aligns to this research proposal’s question to understand what the perceived benefits and drawbacks of AI by teachers are. [14] and [15] reiterate the sentiment of teachers not being replaced by AI and emphasises that AI can be used successfully alongside teachers. [14] and [15] do indicate the research proposal’s hypothesis may be wrong and AI will receive a positive uptake from teachers by listing what AI can offer. Notably, [16] goes further by arguing that a successful integration of AI will require teachers to consider it alongside their current pedagogy. This argument indicates that more research is required to see if AI will be accepted or used by teachers. This identifies a requirement for assessing the level of social acceptance of AI as this is vital for successful integration.

2.5 Balance

Artificial Intelligence in Education refers to the use of AI tools and services to benefit teachers and students. For instance, the use of AI to give live feedback to students. [17]’s research methods involved creating specific AI tools which were trialled on a small group of university students before this scope was gradually increased. Extensive testing of AI models across a range of online, and in person, teaching indicated the successful integration of AI, teacher and student. However, [17] research indicates a requirement for large datasets and the importance of transparency and fairness. This research also only considers university students with a focus on programming. However, [17]’s study presents the argument that teachers' roles are not threatened by AI but could face change which is an area that requires further investigation for secondary schools.

2.6 Ethics

A risk of technology integration is isolation. [18] used secondary survey data from 28,000 households and utilised instrumental variable estimation as the statistical analysis method. [18] concluded that smartphone usage reduces the quality of in-person interactions which indicates a concern for the introduction of new technology. Indeed, [19] conducted a smaller study with 387 university students using a survey to gather data on the use of AI. An important consideration of this research is the use of self reported data as this can be subjective. However, [19]’s results indicate that students who are more supported by AI feel less supported by their teachers. Importantly, this illustrates a gap for identifying if there are ethical impacts of AI in the education sector. Moreover, [20]’s research found that AI tools need to be carefully designed and integrated with teachers as there is a danger of the exacerbation of inequalities through removing vital human-to-human interactions within the classroom.

3 Research Methodology

3.1 Philosophical Approach

The philosophical approach for the IRP should align with the research questions and aims [21]. Given the research questions, and hypothesis, are considering the social implications of AI in the education sector, a combination of post-positivism and interpretivist approaches are appropriate.

Post-positivism is selected because it allows for the measurement of a social phenomenon in a structured way, such as a survey for data collection, while allowing for a nuanced understanding of a social phenomenon [22]. For example, post-positivism allows for the capture of measurable data about the social acceptance of AI and aligns with the research question of evaluating the level of social acceptance of AI by teachers. A critique of post-positivism is that there can be ambiguity in the interpretation of results, however, ensuring a clear research design can clarify the rationale for the research [23]. Moreover, post-positivism’s structured approach for the collection of data, uses objectivity to minimise bias and limit personal interpretation through systematic methods of observation and measurement [24]. This also highlights how selection of participants should be fair and demographic information minimised to maintain confidentiality.

An Interpretivism philosophy is beneficial for an understanding of social phenomena [25]. An advantage of using interpretivism is that it grants greater insights into an individual's experiences and attitudes. Such as, understanding AI’s role in education from a teacher’s perspective, while acknowledging the complexity in human interactions with technology [26]. This can be achieved with the use of open-ended questions on a survey. A criticism for the use of interpretivism is that subjective interpretations are prioritised over the replicability and generalisation of results [27]. Importantly though, the benefit is a deeper understanding about teachers' opinions on AI. A safeguard against subjective interpretations is to ensure methods are clearly recorded, there is transparency in interpretations and methodological pluralism can streamline generalisation [21]. Notably, [28] highlights the strength of post-positivism, identifying general patterns, and the interpretivist approach for identifying unique ways humans interact with AI.

3.2 Methodology

A quantitative methodology will be employed with the use of a survey method for the collection of data. A survey will allow for the collection of standardised data from participants [29]. Notably, this will allow for teacher’s attitudes and concerns about AI to be measured and analysed. For instance, [30] used a survey to collect a broad range of information from students at a university and perform cluster analysis on the results. However, it should be acknowledged that surveys can have response bias [31]. This is a concern because bias can affect the validity and reliability of the survey. Although with this limitation, surveys allow for the efficient collection and statistical analysis of a broad range of data which can then be used to identify patterns. In order to limit response bias the following techniques, from [20]’s research, can be utilised: randomised question order, pilot testing, balanced response options and ensuring anonymity. This will ensure that the survey is reliable, valid and bias in responses is minimised. Furthermore, anonymity of participants will ensure this research is carried out ethically and in line with York University’s ethical policy [32].

Interviews are considered as an alternative to a survey as they provide a deeper level of insight into a person’s experience. For example, [33] collected twenty teachers' perspectives on AI in a semi-structured interview lasting ninety minutes then conducted inductive and thematic analysis. However, the time to plan, organise and conduct in depth interviews across a broad range of teachers is identified as a limitation of the IRP time allowance. A case study would also provide an in-depth understanding [34]. However, a case study would also not allow this research to capture the breadth of responses and opinions required to address the research questions. Indeed, surveys provide an effective and efficient method for the collection of data from a greater number of participants in a shorter time frame, while aligning with the research objective.

Comparative analysis will be performed in order to examine responses [35]. This will be beneficial as the survey should capture a range of different experiences from teachers across subject specialisms. For instance, [36] highlights how comparative analysis enhances the survey method through the identification of trends across participants. Significantly, this approach will provide insights to the social acceptance of AI in the classroom and the factors which affect it. Numerical responses, for feelings or concerns, can be placed on a scale of one to ten and statistical techniques used for analysis. For example, inferential statistical tests, analysis of variance or correlation analysis, are appropriate to understand differences in responses across subject specialisms [37]. This part of the research will involve the computational method of data analysis and visualisation of results. Sentimental analysis will also be performed on open-ended questions, following a qualitative approach, which can be compared to numerical answers to identify trends.

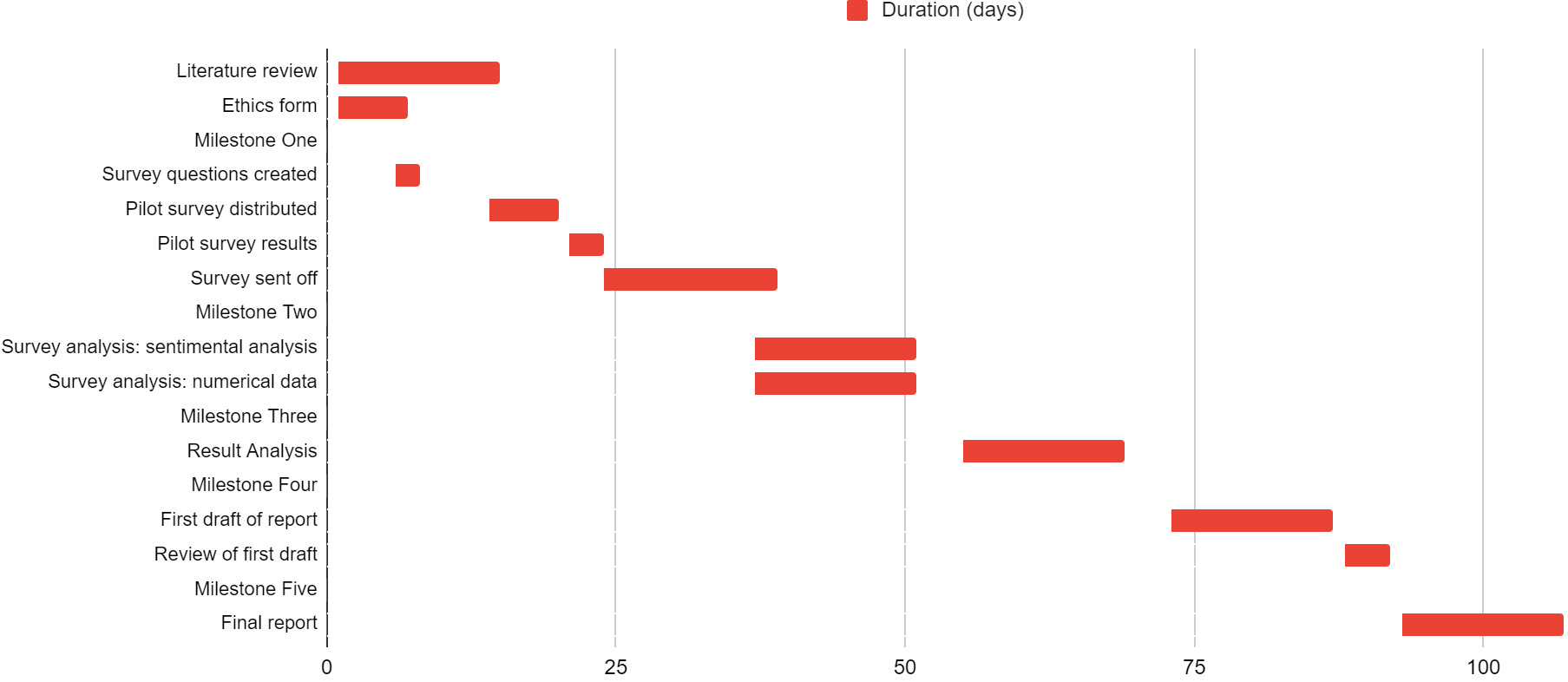
The primary source of data will be collected through the survey method which will be sent out to a range of teachers. Demographic information will be limited but participant’s age range of students taught, years teaching and subject specialism will be asked. This will enable comparative analysis and support the hypotheses of subject specialisms influencing how AI is perceived. Secondary data will be gathered from academic journals, the education sector and government reports in order to contextualise the findings from the survey. A consideration for secondary data sources is that they could be out of date or biassed [38]. However, these sources can be analysed thoroughly to mitigate bias. Moreover, [39] argues that secondary data sources are an important part of contextualising information and to guide hypotheses. Participants of the study will be recruited from professional networking and online communities.

4 Project Management

4.1 Aims and Objectives

The aim of this project is to conduct research into the level of social acceptance of AI in the education sector by conducting a survey of teachers and analysing the results. This will be supported through the following objectives: a literature review of current research, developing a suitable survey, distributing the survey, conducting data analysis of the results and writing up the results. Moreover, SMART objectives can be utilised in order to ensure objectives are manageable [40].

With the project aim and objectives identified, a suitable next step is to assign time estimates to each activity [41]. This will ensure each activity fits within the IRP timeframe and is achievable. Indeed, a Gantt chart for project management, Figure 1, illustrates the breakdown of activities and time allocation.



*Figure 1 - Gantt Chart*

To enhance this, key milestones are used to illustrate the project is meeting significant steps towards completion. Milestone one is the completion of the literature review, milestone two is the distribution of surveys, milestone three is the analysis of surveys, milestone four is evaluating results and milestone five is the completion of the first draft.

4.2 Risks and Limitations

Three risks are identified which could impact the project: number of participants, quality of responses and time management. The first risk can be mitigated, and contingency planned for, by trying to reach as many participants as possible. For instance, by utilising online communities and specialist teaching hubs. If this is not mitigated the impact would be high as a low amount of responses would not generate the data required to answer the research questions. This also highlights a limitation in this study as only a small sample of the teacher population can be reached for participation. The second risk can be reduced by the use of a pilot survey. Notably, a pilot survey will enable the questions to be trialled by a smaller group of participants [42]. This will elevate the risk of questions being misunderstood and responses can be analysed to ensure the questions are suitable to answer the hypothesis. The final risk is mitigated through the use of project planning, such as a Gantt Chart, and time estimates for activities, so that all stages of the project are scheduled and tasks accounted for. Notably, milestones will be used as an indicator, which when completed, will allow the project’s progress to be monitored. Furthermore, float time can be factored into activities which have the potential to run longer than expected.

5 Ethical Implications

The following ethical considerations will be observed throughout the proposed research: informed consent, confidentiality, and the right to withdraw for all participants. These considerations are vitally important to research integrity as the avoidance of harm is a key pillar of research [32]. Moreover, this will ensure the IRP is aligned with the Computer Science Department of the University of York [43] and [44].

Ethics for informed consent can be upheld by the use of voluntary participation and obtaining written consent from participants. [45] highlights how written consent enables participants to be aware of the benefits of a study and if there are any risks associated with it. Confidentiality can be achieved by following data protection laws and regulations to safeguard participants’ information. Indeed, [46] notes that negating privacy laws can place participants' data at risk. Therefore, data should be securely stored and anonymised. Lastly, all participants will be given the right to withdraw from the study.

Reference List

[1] T. Crow, A. Luxton-Reilly, and B. Wuensche, ‘Intelligent tutoring systems for programming education: a systematic review’, in *Proceedings of the 20th Australasian Computing Education Conference*, Brisbane Queensland Australia: ACM, Jan. 2018, pp. 53–62. doi: 10.1145/3160489.3160492.

[2] X. Chen and T. Han, ‘Disruptive Technology Forecasting based on Gartner Hype Cycle’, in *2019 IEEE Technology & Engineering Management Conference (TEMSCON)*, Atlanta, GA, USA: IEEE, Jun. 2019, pp. 1–6. doi: 10.1109/TEMSCON.2019.8813649.

[3] ‘Robots will replace teachers in the next ten years, Vice-Chancellor reveals’. Accessed: Apr. 15, 2024. [Online]. Available: https://www.buckingham.ac.uk/news/robots-will-replace-teachers-in-the-next-ten-years-vice-chancellor-reveals/

[4] ‘The Solution to Our Education Crisis Might be AI’, Futurism. Accessed: Apr. 11, 2024. [Online]. Available: https://futurism.com/ai-teachers-education-crisis

[5] K. Facer and N. Selwyn, ‘Digital technology and the futures of education’.

[6] ‘Artificial intelligence in schools – everything you need to know’, The Education Hub. Accessed: Apr. 12, 2024. [Online]. Available: https://educationhub.blog.gov.uk/2023/12/06/artificial-intelligence-in-schools-everything-you-need-to-know/

[7] Department for Education, ‘Generative AI in education Call for Evidence: summary of responses’, White Paper, Nov. 2023. Accessed: Apr. 07, 2024. [Online]. Available: https://www.gov.uk/government/calls-for-evidence/generative-artificial-intelligence-in-education-call-for-evidence

[8] ‘How we’re reducing teacher workload’, The Education Hub. Accessed: Apr. 09, 2024. [Online]. Available: https://educationhub.blog.gov.uk/2023/01/16/how-were-reducing-teacher-workload/

[9] K. Pollock and D. C. Hauseman, ‘The Use of E-mail and Principals’ Work: A Double-Edged Sword’, *Leadersh. Policy Sch.*, vol. 18, no. 3, pp. 382–393, Jul. 2019, doi: 10.1080/15700763.2017.1398338.

[10] I. A. P. Wogu, S. Misra, E. F. Olu-Owolabi, P. A. Assibong, and O. D. Udoh, ‘Artificial Intelligence, Artificial Teachers and the Fate of Learners in the 21st Century Education Sector: Impli- cations for Theory and Practice’.

[11] ‘Capitalism and alienation: Towards a Marxist theory of alienation for the 21st century’. Accessed: Apr. 11, 2024. [Online]. Available: https://journals.sagepub.com/doi/epub/10.1177/13684310211021579

[12] S. Pokrivcakova, ‘Preparing teachers for the application of AI-powered technologies in foreign language education’, *J. Lang. Cult. Educ.*, vol. 7, no. 3, pp. 135–153, Dec. 2019, doi: 10.2478/jolace-2019-0025.

[13] C. V. Felix, ‘The Role of the Teacher and AI in Education’, in *Innovations in Higher Education Teaching and Learning*, E. Sengupta, P. Blessinger, and M. S. Makhanya, Eds., Emerald Publishing Limited, 2020, pp. 33–48. doi: 10.1108/S2055-364120200000033003.

[14] A. Johnson, ‘5 Ways AI Is Changing The Education Industry’, Educational Technology. Accessed: Apr. 04, 2024. [Online]. Available: https://elearningindustry.com/ai-is-changing-the-education-industry-5-ways

[15] T. Adiguzel, M. H. Kaya, and F. K. Cansu, ‘Revolutionising education with AI: Exploring the transformative potential of ChatGPT’, *Contemp. Educ. Technol.*, vol. 15, no. 3, p. ep429, Jul. 2023, doi: 10.30935/cedtech/13152.

[16] F. Aubrey-Smith and P. Twining, *From EdTech to PedTech Changing the Way We Think about Digital Technology*, 1st ed. Routledge, 2023.

[17] R. Liu, C. Zenke, C. Liu, A. Holmes, P. Thornton, and D. J. Malan, ‘Teaching CS50 with AI: Leveraging Generative Artificial Intelligence in Computer Science Education’, in *Proceedings of the 55th ACM Technical Symposium on Computer Science Education V. 1*, Portland OR USA: ACM, Mar. 2024, pp. 750–756. doi: 10.1145/3626252.3630938.

[18] V. Rotondi, L. Stanca, and M. Tomasuolo, ‘Connecting alone: Smartphone use, quality of social interactions and well-being’, *J. Econ. Psychol.*, vol. 63, pp. 17–26, Dec. 2017, doi: 10.1016/j.joep.2017.09.001.

[19] J. Crawford, K.-A. Allen, B. Pani, and M. Cowling, ‘When artificial intelligence substitutes humans in higher education: the cost of loneliness, student success, and retention’, *Stud. High. Educ.*, pp. 1–15, Mar. 2024, doi: 10.1080/03075079.2024.2326956.

[20] K. Holstein and V. Aleven, ‘Designing for human–AI complementarity in K‐12 education’, *AI Mag.*, vol. 43, no. 2, pp. 239–248, Jun. 2022, doi: 10.1002/aaai.12058.

[21] S. Wright, B. C. O’Brien, L. Nimmon, M. Law, and M. Mylopoulos, ‘Research Design Considerations’, *J. Grad. Med. Educ.*, vol. 8, no. 1, pp. 97–98, Feb. 2016, doi: 10.4300/JGME-D-15-00566.1.

[22] L. Henrickson and B. McKelvey, ‘Foundations of “new” social science: Institutional legitimacy from philosophy, complexity science, postmodernism, and agent-based modelling’, *Proc. Natl. Acad. Sci.*, vol. 99, no. suppl\_3, pp. 7288–7295, May 2002, doi: 10.1073/pnas.092079799.

[23] A. H. Panhwar and et al, ‘Post-positivism: an effective paradigm for social and educational research’, *Int. Res. J. Arts Humanity. IRJAH*, vol. 45, no. 45, pp. 253–259, 2017.

[24] N. Bergen and R. Labonté, ‘“Everything Is Perfect, and We Have No Problems”: Detecting and Limiting Social Desirability Bias in Qualitative Research’, *Qual. Health Res.*, vol. 30, no. 5, pp. 783–792, Apr. 2020, doi: 10.1177/1049732319889354.

[25] S. Babones, ‘Interpretive Quantitative Methods for the Social Sciences’, *Sociology*, vol. 50, no. 3, pp. 453–469, June. 2016, doi: 10.1177/0038038515583637.

[26] J. Wolff, ‘How Is Technology Changing the World, and How Should the World Change Technology?’, *Glob. Perspect.*, vol. 2, no. 1, p. 27353, Aug. 2021, doi: 10.1525/gp.2021.27353.

[27] ‘A Review of key paradigms: positivism VS interpretivism’, *Glob. Acad. J. Humanit. Soc. Sci.*.

[28] C. Hendriksen, ‘Artificial intelligence for supply chain management: Disruptive innovation or innovative disruption?’, *J. Supply Chain Manag.*, vol. 59, no. 3, pp. 65–76, Jul. 2023, doi: 10.1111/jscm.12304.

[29] J. Creswell and J. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*, 5th ed. Thousand Oaks, CA: SAGE Publications, 2018.

[30] ‘STUDENT PERCEPTIONS OF AI-POWERED WRITING TOOLS: TOWARDS INDIVIDUALIZED TEACHING STRATEGIES’, in *Proceedings of the 19th International Conference on Cognition and Exploratory Learning in the Digital Age (CELDA 2022)*, IADIS Press, Nov. 2022. doi: 10.33965/CELDA2022\_202207L010.

[31] N. Menachemi, ‘Assessing response bias in a web survey at a university faculty’, *Eval. Res. Educ.*, vol. 24, no. 1, pp. 5–15, Mar. 2011, doi: 10.1080/09500790.2010.526205.

[32] University of York, ‘Research Integrity and Ethics’, Research Integrity and Ethics. Accessed: Apr. 26, 2024. [Online]. Available: https://www.york.ac.uk/staff/research/governance/research-integrity-and-ethics/

[33] J. Kim, ‘Leading teachers’ perspective on teacher-AI collaboration in education’, *Educ. Inf. Technol.*, Sep. 2023, doi: 10.1007/s10639-023-12109-5.

[34] G. Denes, ‘A case study of using AI for General Certificate of Secondary Education (GCSE) grade prediction in a selective independent school in England’, *Comput. Educ. Artif. Intell.*, vol. 4, p. 100129, 2023, doi: 10.1016/j.caeai.2023.100129.

[35] J. Billiet, ‘Quantitative methods with survey data in comparative research’, in *A Handbook of Comparative Social Policy, Second Edition*, P. Kennett, Ed., Edward Elgar Publishing, 2013. doi: 10.4337/9781782546535.00024.

[36] M. Kołczyńska and Schoene, ‘Survey Data Harmonization and the Quality of Data Documentation in Cross-national Surveys’, in *Advances in Comparative Survey Methodology*, Hoboken, NJ: Wiley, 2018. [Online]. Available: https://doi.org/10.1002/9781118884997

[37] S. Kumar and I. Chong, ‘Correlation Analysis to Identify the Effective Data in Machine Learning: Prediction of Depressive Disorder and Emotion States’, *Int. J. Environ. Res. Public. Health*, vol. 15, no. 12, p. 2907, Dec. 2018, doi: 10.3390/ijerph15122907.

[38] D. R. Kapur, ‘Research Methodology: Methods and Strategies’.

[39] S. Irwin, ‘Qualitative secondary data analysis: Ethics, epistemology and context’, *Prog. Dev. Stud.*, vol. 13, no. 4, pp. 295–306, Oct. 2013, doi: 10.1177/1464993413490479.

[40] M. B. Bjerke and R. Renger, ‘Being smart about writing SMART objectives’, *Eval. Program Plann.*, vol. 61, pp. 125–127, Apr. 2017, doi: 10.1016/j.evalprogplan.2016.12.009.

[41] C. W. Dawson, *Projects in computing and information systems: a student’s guide*, 2nd ed. Harlow, England ; New York: Addison-Wesley, 2009.

[42] F. Wadood, F. Akbar, and I. Ullah, ‘THE IMPORTANCE AND ESSENTIAL STEPS OF PILOT TESTING IN MANAGEMENT STUDIES: A QUANTITATIVE SURVEY RESULTS’, vol. 27, 2021.

[43] ‘BCS Code of Conduct’, BCS. [Online]. Available: https://www.bcs.org/membership-and-registrations/become-a-member/bcs-code-of-conduct

[44] B. Brinkman, D. Gotterbarn, and et al, ‘ACM Code of Ethics and Professional Conduct’, Code of Ethics. Accessed: Apr. 23, 2024. [Online]. Available: https://www.acm.org/code-of-ethics

[45] M. Y. P. M. Yusof, C. H. Teo, and C. J. Ng, ‘Electronic informed consent criteria for research ethics review: a scoping review’, *BMC Med. Ethics*, vol. 23, no. 1, p. 117, Nov. 2022, doi: 10.1186/s12910-022-00849-x.

[46] K. Macnish and J. Van Der Ham, ‘Ethics in cybersecurity research and practice’, *Technol. Soc.*, vol. 63, p. 101382, Nov. 2020, doi: 10.1016/j.techsoc.2020.101382.