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Email: editor@jasss.pk, Website: https://jasss.pk

Qualitative Methods in Statistics and Methodology: Artificial Intelligence (AI)

Aida Mehrad (Corresponding Author)
C3S Business School, Barcelona, Spain
Email: aida@csss.es
Mohammad Hossein Tahriri Zangeneh
C3S Business School, Barcelona, Spain
Email: mtahriri@csss.es
Meriem Bouzedif
C3S Business School, Barcelona, Spain
Email: mbouzedif@csss.es
Neema George Rweramila
C3S Business School, Barcelona, Spain
Email: nrweramila@csss.es
Hamza Boutament
C3S Business School, Barcelona, Spain
Email: hboutament@csss.es

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Abstract
This paper explores the potential of applying artificial intelligence (AI) in the qualitative research framework to enhance the quality of data analysis and theory advancement based on eight professors' answers and points of view from different countries. It examines how qualitative research can be utilized in areas such as health policy and education, ethical issues, and the biases involved with using AI. While AIs like ChatGPT can perform certain data analysis activities, critical analysis involving the interpretation of data will always require the human brain. The paper underscores the importance of human supervision in AI-driven research, ensuring the depth and interpretative propensity of the research. This emphasis on the indispensable role of human oversight in AI-driven research is intended to underline the importance of the readers' expertise and experience. It also describes the issues related to the application of AI in qualitative research, such as interpretive philosophy. The paper proposes a potential solution: to balance AI and human knowledge, thereby reassuring the audience about the continued significance of their role in the research process.
Keywords: Artificial Intelligence (AI), Methodology, Research, Qualitative Methods

Introduction
The role of research and using technologies in this area is always considerable, and most scholars need this attitude to start their research journey. According to Kothari (2004), every academic research must be based on one of two approaches: qualitative and quantitative, or a combination of both. Jones et al. (2019) argue that scholars should choose the most suited

approach for their research based on the data type they will gather and how the findings will be used and presented. Qualitative research can be defined as the strategy of investigation that aims to understand and gain profound knowledge about human behavior and experiences. In other words, this type of research aspires to appreciate mainly social science (Renjit et al., 2021). Moreover, the qualitative approach focuses on gathering primary textual data and analyzing it using interpretive methods. Furthermore, since qualitative research tends to study exploratory phenomena, it can uncover new insights and generate new theories (Taherdoost, 2022). In the same way, Groth (2010) states that qualitative research can be valuable in statistics; for instance, the in-depth descriptions provided can help scholars understand a given study's context and environment. Moreover, qualitative research findings can help construct another quantitative research about the same topic. Furthermore, the insights provided by qualitative research can help understand the causes of patterns observed in quantitative research. Qualitative research and statistics complement conducting meaningful research and gaining knowledge about a discipline. According to Hamilton et al. (2023), AI tools like chat GPT can help conduct complex human-centered tasks, such as qualitative research analysis. Moreover, AI tools can help identify oversights, alternative frames, and personal biases. The author predicts that AI will keep improving shortly and become an additional tool to facilitate research tasks, emphasizing the potential of AI to improve research tasks. The above raises several questions about the relationship between AI and qualitative research: Can AI provide better findings than scholars? How can AI be used in conducting qualitative research? Can AI be trusted without human intervention? What are the ethical concerns and the reliability of using AI for research? This paper shall provide insights into the importance of AI in conducting academic qualitative research by exploring the usage of AI in theory development and qualitative data analysis. It will also discuss the ethical concerns of using AI in research.

Literature Review

In the study of Gray et al. (2020), which focused mainly on qualitative research methods in interviews, particularly video conferencing tools like Zoom, the researchers offered a cost-effective and convenient alternative to in-person interviews for qualitative researchers. This method provides a positive experience for participants with benefits such as convenience, accessibility, and time-saving. It economically supports research aimed at diverse and geographically dispersed populations. Qualitative research methods are valuable in health services and health policy research, providing detailed descriptions of complex phenomena, tracking unique or unexpected events, and giving voice to those whose views are rarely heard. Qualitative and quantitative methods can be used together, but special training and experience are essential to applying these methods (Sofaer, 1999).

Role of AI and Technology in Research Methods /Qualitative Studies

The study conducted by Hasija and Esper in 2022 focused on artificial intelligence (AI). The researchers explained that AI uses data-driven machine-learning algorithms to solve problems, like how humans do it. Artificial intelligence was first coined in 1955. Researchers from various disciplines have raised concerns regarding the use of AI in recent literature. For instance, information systems researchers have highlighted how the underrepresentation of women and minorities in underlying data can lead to gender and ethnic biases in AI algorithms. Consequently, AI justice and equality issues have been explored in areas such as hiring and criminal justice. Recognizing these concerns, the Organization for Economic Co-operation and Development has developed principles for ethical AI development, which focus

on transparency, human rights, racial and social inclusiveness, and holding AI system developers and operators accountable. AI is one of the fastest-growing disciplines that has disrupted many sectors, as stated by Longo (2019). Initially, it was mainly for computer scientists and engineers. Still, it has expanded its horizons and empowered many other disciplines, contributing to developing novel applications in many sectors, such as medicine and health care, business and finance, psychology and neuroscience, and physics and biology, to name a few. However, one of the disciplines in which artificial intelligence has yet to be fully explored and exploited is education. In this domain, many research methods are employed by scholars, lecturers, and practitioners to investigate the impact of different instructional approaches on learning and to understand how learners acquire skills and knowledge. One such method is qualitative research grounded in observations that analyze non-numerical data. It focuses on seeking answers to why and how a particular phenomenon occurs rather than on its occurrences. Longo explored and discussed the impact of AI on qualitative research methods and focused on how it has empowered qualitative research methods so far and how it can be used in education to enhance teaching and learning. Therefore, AI has a significant role in qualitative studies and can be helpful for scientists and scholars. AI has become widespread across various industries, including business, science, art, and education. It has been used to enhance user experience, improve work efficiency, and create numerous job opportunities for the future. However, there is still a need to explore public understanding of AI technologies and how to define AI literacy. As such, a recent exploratory review was conducted to conceptualize the emerging concept of "AI literacy" in search of a sound theoretical foundation to define, teach, and evaluate AI literacy. Ng et al. (2021) provided a consolidated definition of AI literacy, encompassing teaching and ethical concerns, laying the groundwork for future research, such as developing competency and assessment criteria for AI literacy.

Exploring the Use of Artificial Intelligence for Qualitative Data Analysis: The Case of ChatGPT

The use of artificial intelligence in qualitative data analysis is on the rise, especially with the current large language models such as ChatGPT. In this paper, David L. Morgan (2023) discusses the possibility and efficiency of applying ChatGPT for qualitative data analysis and compares the outcomes of the proposed approach to traditional manual coding. The research question focuses on whether the labor-saving coding practice can be eliminated using ChatGPT while keeping qualitative analysis rich and valid.

Morgan’s work is positioned against the background of the last decade’s progress in utilizing qualitative data analysis software that involves AI, like ATLAS. Ti and MAXQDA. In the past, these tools used methods such as sentiment analysis and semantic coding, which belong to the Natural Language Processing (NLP) family, to automate some steps in qualitative analysis. The novelty in this study is based on the approach where ChatGPT is regarded as a ‘black box’ that translates natural language inputs into theme responses from qualitative data.

The study used two other qualitatively investigated data sets. The first data set entailed a focus group discussion with first-year graduate students, and Braun and Clarke's (2006) Reflexive Thematic Analysis was used. The second dataset involved focus groups with dual-earner couples caring for children and elderly parents, using focus groups and Morgan’s Iterative Thematic Inquiry. To test the AI’s ability to find and replicate themes, Morgan used ChatGPT

to ask questions about these datasets and then compared the answers to the prior manual examinations.

Findings showed that though the ChatGPT model successfully analyzed concrete, descriptive themes, it failed to interpret the subtle, inferential themes efficiently. For example, in the analysis of the graduate student experience, ChatGPT pointed to specific concerns, such as balancing school with other activities, and did not reveal that the primary concern of 'transition to a new role' was latent. Again, in the dual-earner caregiver dataset, while ChatGPT summarised prospects related to flexibility and strategizing, it did not capture the significant theme of time management.

The Use of Artificial Intelligence (AI) in Qualitative Research for Theory Development

In her article, Dr. Jane Smith focuses on the role of qualitative research and theory development with the help of artificial intelligence (AI). She explains how, through applying AI, the research gaps can be recognized, the various and intricate conceptual frameworks can be formulated, and reasonable conclusions can be drawn that would enhance the theoretical knowledge in the different qualitative studies. In this paper, based on a critical and conceptual methodological approach, the author, Smith, analyses the potential of AI in qualitative data analysis, asserting that it contributes to the automation and improvement of the research process.

However, Smith also records several issues regarding the ethical use of AI, bias in the system, and academic integrity. She points out that while researchers should employ AI technologies, they should do so while scrutinizing the outputs provided by the technologies, which should not replace researchers' cognitive and interpretative abilities. The study of Smith is, in a way, consistent with the other works that call for continued qualitative research to enhance the AI applications in qualitative research and come up with standard and ethical protocols for the utilization of the tools. Through her work, she can present how qualitative research could be enriched with the help of AI and, at the same time, divulge the possible pitfalls that could arise from its use, hence proposing that the use of AI in qualitative research should be done to an optimal extent to enhance the value brought in by human analysis.

Integrating AI-Language Models in Qualitative Research: Replicating Interview Data Analysis with ChatGPT

AI is also relevant to qualitative research due to its present efficiency in data analysis, coding, or even developing themes. AI language models, especially the ChatGPT, have significantly influenced qualitative research methods. Such a development is seen in a study that reviewed obesity prevention interventions and compared the traditional human approach to using machine learning AI. Another advantage of using AI in qualitative research is the tremendous saving in time used to code the data and analyze them for themes. ChatGPT quickly handles large amounts of text data while maintaining stability, thus reducing the users' cognitive biases. This efficiency speeds up the research process and produces harsh results that allow a human researcher to maintain an objective view. AI tools such as ChatGPT can also increase the richness of the qualitative analysis by pointing out patterns and feedback loops that may remain unnoticed by the researcher. For instance, in a study by Jalali et al. (2019), ChatGPT suggested other feedback loops concerning stakeholders' motivation and program engagement that were not mentioned in the original paper. This capability suggests that

through AI, one can look at data from a different perspective and get a better understanding of it. Overall, the usefulness of AI cannot be denied, yet AI has some issues with the context and qualitative aspects of data. The study by Jalali et al. (2019) was challenging for ChatGPT to interpret some specifics, such as the degradation of the implemented components and their influence on intervention sustainability. This limitation shows that although AI can be beneficial in analyzing data, it might not be as effective as researchers. Based on the study conducted by Jalali et al. (2019), it became apparent that AI language models could be helpful as additional tools in qualitative research. As progress continues, these tools might offer even greater assistance, supplementing the authors' ability to comprehend intricate results. In future studies, AI should be used in conjunction with conventional approaches to obtain the benefits of the speed and impartiality of AI while still valuing the contextual and theoretical understanding of man.

The Use of Artificial Intelligence (AI) in Qualitative Research for Theory Development

Christou (2023) provides a detailed discussion of the application of Artificial Intelligence (AI) in adopting qualitative research emphasizing theory construction. The author also highlights the significance of theory development in academic research: accumulating new knowledge, progressing the fields of study, and forming theoretical frameworks that may help explain phenomena. Albeit there is evidence of qualitative researchers' contribution to theory development, academia has not extensively studied the dynamics of AI within this regard, and promising knowledge gaps exist as to how AI can be effectively utilized for theory advancement.

Christou utilizes critical and conceptualization methodological dynamics to analyze AI's contribution to theory development. The paper critically analyzes AI in theory development and maps the relationship between theory and AI. Also, the research offers insights into the appropriateness of AI in theory construction, development of new theories, or improvement of existing theories. While there is controversy over the need for AI tools in theory development because of the essential nature of a researcher's cognitive and evaluative abilities, the contribution of AI to the development of theory should not be dismissed. According to Christou's insights, AI can revolutionize qualitative research and contribute significantly to the theory development. However, human cognitive functions remain critically important. This exploration paves the way for further research in the future that expands on the opportunities and consequences of applying AI in academic theory advancement (Christou, 2023).

Brief Process Plan-Project

The qualitative Approach is defined by the phenomena' nature, including quality, manifestations, context, and perspectives, but excludes cause and effect range, frequency, and place. It typically includes words rather than numbers (Philipsen. & Vernooij-Dassen, 2007). Qualitative sampling involves incorporating all relevant observations in a study, using an iterative approach until saturation. Purposive sampling, based on literature or theory, covers all variations. Assessors should evaluate the soundness of these strategies and adapt them as needed. (Russell & Gregory, 2003). Research Philosophy is interpretivism in AI research, emphasizing a human-centered focus and exploring user understanding and adaptation. It addresses ethical issues like privacy and biases and informs policies to ensure socially responsible development and implementation of AI technologies. Research Type is its

inductive approach, meaning it is data-driven and focuses on gathering context-rich data through methods like interviews and focus groups. It is exploratory, aiming to understand phenomena from the ground up, particularly in the rapidly evolving field of AI. Inductive research can provide fresh perspectives and novel theoretical contributions. Research Limitation is the researcher-researched relationship and the researcher's background and experience. This may include professional experience, gender, age, or ethnicity (Shenton, 2004). The researcher cannot be isolated from the process; these details can influence conversations with interviewers, making it crucial for readers to be aware of these details (Boeije, 2012). Interpretivism offers challenges such as subjectivity, complexity, and resource intensiveness. Researchers must maintain objectivity, analyze complex qualitative data, and balance depth of insight with practical constraints to ensure a comprehensive understanding.

Research Time Horizon is Cross-sectional - One time using the Time Plan below from 3rd July 2024.

Table 1. Research Timeline

ACTIVITIES	START DATE	END DATE
To create and choose a topic	3rd July 2024	9th July 2024
Finding related research papers	10th July 2024	16th July 2024
Preparation of data collection: Interview Questions	17th July 2024	23rd July 2024
Data Collection from participates	24th July 2024	29th July 2024
Talking about the drafts, introduction, and conclusion, specifically	30th July 2024	5th August 2024
To check on reference and citation	6th August 2024	8th August 2024

Data Collection

Firstly, Pilot interviews are an example of this, where interview guides, interview sites, and audio-recording options are tested with a small sample to determine the best wording, question types, and length for patients with concentrating issues (Hijmans & Kuyper, 2007). Designing an interview schedule is crucial for qualitative research. Open-ended questions and neutral and understandable questions are essential. Start with easy questions and progress to more complex topics. Pilot the schedule on multiple respondents before data collection to ensure clarity and ability to answer research questions (Legard et al., 2003). Education interviews typically last 10-15 minutes and can be conducted one-off or repeatedly. This approach helps build confidence and rapport, generating rich data. Primary data is an interview using open-ended questions. We had 8 participants answering the interview questions as mentioned below their responses. The participants are both male and female professors. Secondary data, or document study, involves a researcher reviewing written materials like archives, annual reports, guidelines, policy documents, or social media content, including personal and non-personal ones (Russell & Gregory, 2003).

Data Analysis

The coding process involves defining a common approach, creating a coding list, and establishing an ordinary meaning of individual codes, followed by independent coders and regular team discussions. The interview process should be natural and less rehearsed, with the interviewer familiarising themselves with the schedule. Researchers must possess the skills to collect comprehensive and representative data. Essential skills include attentive listening, open body language, strategic use of silence, reflecting on remarks, and seeking clarification. Avoid leading or loaded questions that may influence responses. At the end of the interview, thank participants for their time and ask for any additional information. Debrief participants about the study after the interview. All interviews should be tape-recorded and transcribed verbatim to protect against bias and provide a permanent record. Field notes can be made during and after each interview for data analysis (Dubey & Kothari, 2022).

Methodology Steps

The participants were controlled using question one. Eight lecturers and professors from universities and business schools in different countries answered the online interview and mentioned their attitudes and experiences by answering the online questionnaire.

Question 1. Please share the universities or business schools you teach or have taught at with the city or country name.

Countries: Philippines, Ethiopia, Oman, Spain, Germany, Argentina, Sweden, Finland, United Kingdom, Austria, Netherlands, Russia and Pakistan.

University—Business School: C3S Business School, Global Business School Barcelona, University of Gujrat, Universitat Hamburg, Esic University, Universidad de Buenos Aires (Argentina), University of Jaén, Abertay University, Vienna University of Economics and Business, Stockholm Business School, Stockholm University (CEMS), Aalto University (CEMS), University of Groningen, and St. Petersburg State University.

Participants are working from different countries, and the list of universities and business schools is as mentioned above.

Question 2. Please share your thoughts on using qualitative methods in social science in the current era.

P1. The participants explained their knowledge of using qualitative methods in social science in the current era. Their response is mentioned in the summary below.

P2. Qualitative methods are crucial in social science research due to their ability to address abstract concepts. However, these methods require preparation, ground knowledge, and dedication. With globalization, concepts like diversity and integration become increasingly important. AI is helping professors streamline quantitative methods, allowing for more relevant data-driven assignments.

P3. Technological advancements improve qualitative research by providing digital data collection and analysis tools. Mixed-methods approaches are becoming more common,

combining qualitative and quantitative methods. Despite challenges, qualitative research is crucial for capturing diverse perspectives and understanding complex social issues.

P4. Qualitative methods are essential in addressing complex social issues like globalization, migration, inequality, and climate change. They provide an in-depth exploration of individuals' and communities' experiences, capturing nuanced perspectives and enabling researchers to understand the full context of these problems.

P5. Technological advancements have transformed qualitative research by enhancing data collection and analysis tools, allowing researchers to reach a wider, diverse population. Interdisciplinary research, which combines qualitative and quantitative methods, is on the rise, providing a comprehensive understanding of complex social phenomena and promoting interdisciplinary approaches.

P6. Qualitative research increasingly recognizes lived experiences' relevance in policy and practice. Researchers can inform effective interventions by focusing on subjective realities, such as identity and culture, making it particularly useful in public health, education, and social work.

P7. Qualitative research prioritizes ethical considerations like informed consent, confidentiality, and trust, respecting participant rights. They are ideal for studying diverse and marginalized groups, promoting inclusivity, and fostering equitable policies and practices, especially in vulnerable populations.

P8. Challenges and Limitations: Despite their strengths, qualitative methods also face challenges. These include issues related to the generalizability of findings, the subjectivity of interpretation, and the time-consuming nature of data collection and analysis. However, these challenges can be mitigated through rigorous methodological approaches, reporting transparency, and complementary quantitative methods.

In conclusion, qualitative methods are indispensable in the current era of social science research. They provide deep, contextually rich insights into complex social phenomena, inform policy and practice, and promote diversity and inclusion. Integrating technological advancements and interdisciplinary approaches further enhances the value and applicability of qualitative research.

Question 3. Please share your thoughts on how AI tools impact qualitative methods and statistics.

P1. AI tools like Bayesian can enhance research by generating ideas and introducing different qualitative approaches. However, they should not replace qualitative research for evidence collection. Natural Language Processing (NLP) is a subset of AI that can extract hidden patterns from texts, providing insights into participant stress levels. Proper AI management can mitigate potential threats.

P2. AI tools are revolutionizing qualitative research and statistical analysis by automating data processing and uncovering complex patterns. They speed up data handling, revealing insights overlooked by humans. However, optimal benefits are achieved when combined with human intelligence and ethical considerations. Although it is an important tool for analyzing raw data, using generic and general AI can be problematic if well-trained. As researchers, we can rely on AI to speed up our analysis, but our analyses need critical thinking and a strong theoretical framework that must be clearly stated.

P3. AI tools significantly impact qualitative methods by automating transcription and sentiment analysis. These tools speed up data collection, allowing researchers to focus on analysis rather than tedious tasks. AI-powered transcription services, like Otter.ai and Rev, enable researchers to analyze large sets of textual data.

P4. AI tools are revolutionizing data analysis by identifying patterns, themes, and trends within qualitative data. They enhance the depth and breadth of qualitative analysis by utilizing Natural Language Processing (NLP) techniques. AI tools also facilitate digital ethnography by analyzing online communities and social networks. They can analyze video and image data, making them particularly useful in visual anthropology and other multimedia fields.

P5. AI enhances statistical handling by automating data cleaning and preprocessing processes, enabling comprehensive analysis of large datasets. This results in higher data quality and reduced time spent on preliminary data management.

P6. AI enhances data analytics by utilizing advanced techniques like neural networks and decision trees, identifying complex patterns and relationships within data, thereby enhancing predictive analytics in fields like economics and healthcare.

P7. AI enhances accuracy and efficiency by automating complex statistical analyses and enabling real-time data analysis, making it crucial in fast-paced environments like financial markets and marketing.

P8. AI algorithms require ethical considerations to ensure transparency and security. Researchers must be vigilant about bias and bias, mitigate it, and maintain trust. Transparency is crucial in understanding decision-making processes, while data privacy and security are essential, especially in fields like healthcare and finance. AI requires technical expertise in programming and data science, requiring ongoing education and training to effectively integrate these tools into research and development.

Conclusion: AI tools significantly enhance the capabilities of qualitative methods and statistics, offering new ways to collect, analyze, and interpret data. While they provide numerous benefits regarding efficiency, accuracy, and depth of analysis, researchers must be aware of their use's ethical implications and challenges. By balancing the advantages of AI with a commitment to ethical research practices, social scientists can leverage these powerful tools to advance knowledge and address complex societal issues.

Question 4: Which AI tools did you recommend for qualitative methods?

The participants discussed the limited availability of free qualitative tools. However, the majority, meaning half of them, mentioned chat GPT as their primary tool, alongside other augmented and virtual reality tools, namely PSPP and Weka, Claude, QuillBot, PaperPal, Iris.ai, Zotero, Scite, Litmaps, Research Rabbit, and Perplexity.

Some participants recommend AI tools and services from top companies like OpenAI, Microsoft, Google, and Meta for qualitative research, enhancing data collection, transcription, coding, analysis, visualization, and interpretation.

P1. The tool mentioned utilizes natural language understanding, text generation, and conversational abilities to automate qualitative data coding, generate thematic summaries, and assist in drafting reports.

P2. Azure Cognitive Services offers speech-to-text, text analytics, sentiment analysis, and language understanding tools for transcribing interviews, sentiment analysis, and extracting key phrases.

P3. Microsoft Power BI offers data visualization, interactive dashboards, and real-time analytics for qualitative data visualization and mixed methods research. Google Cloud Natural Language API provides text analysis, entity recognition, sentiment analysis, and syntax analysis for automated analysis.

P4. Google Speech-to-Text and Meta AI are tools for analyzing social media data, transcribing focus group discussions, and enhancing text analysis, image recognition, and understanding social media interactions, with high-accuracy transcription and speaker diarization capabilities.

P5. IBM Watson offers natural language understanding, sentiment analysis, entity extraction, and language translation tools for text analysis and understanding complex qualitative data. These tools are handy for sentiment analysis of customer feedback.

P6. NVivo and Atlas. Ti is an advanced qualitative data analysis tool that supports various data formats and facilitates organizing and visualizing ethnographic data to understand cultural patterns and key themes in analyzing interview transcripts.

P7. Dedoose is a tool that integrates qualitative and quantitative data analysis, making it ideal for combining survey and interview data for comprehensive analysis.

P8. AI tools in qualitative research require ethical considerations like bias mitigation, data privacy compliance, and transparency to ensure trust and credibility in findings while adhering to data protection regulations such as GDPR to safeguard participants' privacy.

Conclusion: Integrating AI tools from leading companies like OpenAI, Microsoft, Google, Meta, and IBM with specialized qualitative analysis tools can significantly enhance the efficiency and depth of qualitative research. By leveraging these tools, researchers can uncover deeper insights, streamline workflows, and make meaningful contributions to their fields.

Discussion

By reviewing different studies and participants' ideas, the current study's researchers recognized the importance of technology and were updated accordingly. As observed, the studies altogether endorse the importance of qualitative research methods in different fields, stressing the approach's kind and degree of flexibility. Gray et al. (2020) have shown that with tools such as Zoom for interviewing, remote ways of conducting qualitative interviews are efficient and convenient in health services and policy research. Hasija and Esper (2022) discussed using AI in qualitative research, identifying its advantages in the speed of data analysis but mentioning the possible biases. Morgan (2023) evaluated the use of ChatGPT in qualitative data analysis, which revealed that it was efficient but less effective in theme interpretation of the more complex ones. Smith (2023) explained the concept of theory development and how AI could be used optimally in conjunction with human cognitive skills. Jalali et al. (2019) and Christou (2023) also provided an additional affirmation on the use of AI in qualitative research as an effective and valid augmentation for new perspectives in research data analysis while arguing for human supervision of analysis, which is critical for depth and accuracy in qualitative analysis.

Based on the primary data collected for this research, the lecturers highlighted the importance of qualitative methods in social science, notably regarding complex social issues and subjective matters that cannot be fully acknowledged using quantitative methods. Besides, they agreed that technological advancements are improving the applicability and effectiveness of qualitative research. Furthermore, the lecturers believed that AI improved the use of qualitative methods and enhanced the accuracy of the findings by utilizing advanced techniques like natural language processing, NLP, and sentiment analysis. However, some professors mentioned the ethical concerns and challenges regarding using AI in qualitative research. Lastly, the professors recommended numerous AI tools, predominantly Chat GPT and other AI tools, that can be useful in qualitative research; for instance, they mentioned Azure cognitive services as a transcription and data analysis tool and Microsoft Power BI for data visualization and emotional analysis. Ultimately, they agree that AI tools can provide rich, in-depth insights and alleviate labor-intensive tasks.

AI tools can help scholars conduct more accurate and in-depth qualitative research. First and foremost, AI can improve the precision and accuracy of qualitative data analysis since it minimizes human error and bias, consequently improving its accuracy and consistency. In addition, AI can enhance research efficiency by taking over labor-intensive tasks like transcription and data analysis, thus reducing the time and resources allocated to those tasks. Finally, AI can generate more in-depth results and findings. Thus encouraging researchers to opt for the qualitative approach in future studies. (Nwankwo, 2024). However, the excessive use of AI can present some challenges, such as ethical concerns, since the use of AI software can violate the privacy of the respondents if the inputs are not sufficiently encrypted. (Morgan, 2023). In other words, using AI in research must follow strict guidelines to ensure data protection. Besides, AI analysis can be altered by algorithmic bias.

Conclusion

Integrating artificial intelligence (AI) into qualitative research presents promising opportunities to enhance both analytical depth and efficiency, as evidenced by insights from experts across various fields. This paper highlights how AI can assist researchers by automating data processing, identifying hidden patterns, and reducing the labor-intensive aspects of qualitative analysis. However, examples from areas such as health policy and education demonstrate that the interpretive complexity of qualitative research still requires human oversight to ensure that findings are contextually relevant and ethically sound.

While AI is powerful, it lacks the nuanced ability to interpret meaning, significance, and the subtleties of human experience—qualities central to qualitative research. Concerns about bias, ethical implications, and interpretive limitations underscore the importance of a balanced approach in which AI acts as a complementary tool rather than a replacement for human insight. Researchers play an irreplaceable role in overseeing AI applications, utilizing their expertise to guide and meaningfully interpret the findings.

Ultimately, this paper advocates for a synergistic approach that capitalizes on AI's capabilities while adhering to the foundational principles of qualitative research. This approach ensures that AI enhances the research process without compromising human-centered studies' depth, ethics, or validity. By adopting this balanced methodology, researchers can leverage AI's advantages while maintaining the essential interpretive rigor at the core of qualitative inquiry.

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