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The Utilization of Generative AI in Designing Data Analytics and Visualization Workshop (Case Study: GDGoC at Universitas Negeri Malang)

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Abstract*— This study explores the use of Generative Artificial Intelligence (Generative AI) in designing a Data Analytics and Visualization workshop within the Google Developer Groups on Campus (GDGoC) community at the State University of Malang. Employing a qualitative case study approach, data were gathered through in-depth interviews, observations, and document analysis involving key informants directly engaged in the planning and execution of the workshop. The findings reveal that Generative AI significantly enhanced the efficiency, effectiveness, and quality of the workshop program. The technology was utilized across various stages, from conceptualizing the event and gathering references to preparing presentation materials. Respondents noted that Generative AI facilitated faster and more systematic material organization, supporting prior research on its ability to improve productivity and efficiency in educational settings. Nevertheless, the study also identified challenges, including reliance on AI, difficulties in generating appropriate prompts, and the necessity of validating AI-generated content. In the context of Human-Computer Interaction (HCI), Generative AI was perceived to offer favorable usability and user experience, although adequate digital literacy is essential to ensure its ethical and effective use. In conclusion, Generative AI presents considerable potential as a tool for developing training programs, with human involvement remaining critical to ensure the relevance and accuracy of the generated information.

Keywords*— Generative AI, training program design, data analytics and visualization, Human-Computer Interactions.

I. INTRODUCTION

In recent years, the demand for analytical thinking has significantly increased across industries, driven by rapid technological advancement and the evolving needs of the digital economy. According to the World Economic Forum (2025), analytical thinking ranks among the top competencies required in the next five years. This competency is especially relevant in the field of data analytics and visualization, which plays a crucial role in understanding complex information and supporting data-driven decision-making. Responding to this need, technology-based approaches—particularly the use of visualization tools and Generative Artificial Intelligence (Generative AI)—are seen as powerful instruments for enhancing analytical skills, fostering student engagement, and promoting critical thinking [1][2].

The Google Developer Groups on Campus (GDGoC) at Universitas Negeri Malang initiated a workshop program focusing on data analytics and visualization to address the increasing interest and skill gaps in this area. A preliminary survey revealed that 12 out of 21 respondents expressed high interest in such topics. However, the program developers encountered several challenges, including designing relevant and industry-aligned content under limited time and resources. To tackle these challenges, they began incorporating Generative AI tools such as ChatGPT, Gemini, and DeepSeek into the workshop development process. These tools were used to generate ideas, outline learning modules, and support content creation. Despite their benefits, developers found the AI-generated outputs often lacked contextual accuracy, requiring manual revision and validation [3][4].

Generative AI has the potential to revolutionize educational practices by producing adaptive and personalized training content [5][6]. However, integrating this technology into educational design—especially in technical domains like data analytics—raises questions about its practical relevance, ethical implications, and alignment with learning goals. Observations from GDGoC developers revealed that while AI improved content structure and efficiency, human oversight remained essential to ensure quality and contextual appropriateness. This insight aligns with earlier research that emphasizes the limitations of AI in fully understanding instructional contexts and learners' needs [7][8].

Generative Artificial Intelligence (Generative AI) has emerged as a transformative tool in instructional design by enabling adaptive, personalized, and efficient learning experiences. It supports content generation, real-time feedback, and curriculum planning tailored to learners' needs. In data-focused workshops, such as those involving analytics and visualization, Generative AI assists with

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content structuring, training module development, and participant feedback analysis. While its benefits are well-documented, the pedagogical integration of AI must consider ethical issues such as data bias, instructional relevance, and learner readiness [9][10].

Human-Computer Interaction (HCI) is a multidisciplinary field that explores how users engage with digital systems. In the context of Generative AI, HCI becomes increasingly relevant, as users rely on interactive interfaces and natural language inputs. Core aspects such as usability, user experience (UX), cognitive load, and trust are central to how learners interact with AI systems [11][12]. Emphasize four HCI principles necessary in AI systems: transparency, controllability, personalization, and collaboration. These principles ensure that AI tools are not only technically effective but also socially and cognitively accessible in educational settings.

Data analytics and visualization are increasingly essential skills in the digital economy. In both education and industry, these competencies support critical thinking, problem-solving, and decision-making. Effective data visualization enables learners and professionals to understand complex datasets and translate them into actionable insights [13][14]. Industries now demand professionals with not only technical skills but also the ability to communicate findings clearly and work collaboratively [15][16]. In response, higher education institutions are integrating experiential learning models with data visualization tools to enhance analytical thinking.

Designing AI-assisted workshops for data analytics presents both opportunities and challenges. Tools like ChatGPT or DeepSeek have been used to accelerate content development, simulate real-world scenarios, and support instructors in delivering tailored training materials. However, implementation requires technical readiness, ethical consideration, and teacher support [17][18]. The success of these tools depends on their integration into pedagogical models and alignment with user needs. A human-centered approach remains essential to bridge the gap between AI capabilities and educational goals [19].

The Google Developer Groups on Campus at Universitas Negeri Malang (GDGoC UM) serves as a relevant case for understanding how student-led communities adopt Generative AI. Tools like ChatGPT, Gemini, and DeepSeek are frequently used to develop social media content, study materials, and workshops. The adoption of Generative AI in GDGoC UM is driven by members' strong interest in technology, with engineering students forming a significant proportion of the core team. Despite its benefits, members highlight the need for human intervention in validating AI-generated content, especially in technical fields like data analytics and visualization.

This study aims to explore the real-world application of Generative AI in designing a data analytics and visualization workshop within the GDGoC community. Specifically, it seeks to identify practical usage patterns, examine technical and pedagogical challenges, and assess the impact of AI on the relevance and efficiency of workshop development. The findings are expected to offer valuable insights for educators, workshop designers, and institutions interested in responsibly adopting AI technologies in learning environments.

II. PROPOSED METHOD

This study employed a qualitative case study approach to explore the practical implementation of Generative AI in designing a skills workshop on data analytics and visualisation within a university-based technology community. This approach was chosen to gain a comprehensive understanding of a complex phenomenon within its real-life context [20]. Data collection methods included semi-structured interviews, participatory observation, and document analysis. The data analysis followed framework, comprising data condensation, data display, and conclusion drawing [21].

Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you. The study was conducted at the Google Developer Groups on Campus (GDGoC) chapter at Universitas Negeri Malang. This community, consisting of students from various faculties, focuses on technology and innovation. The research focused on one of its key programs, the Skills Workshop, which involved 21 participants. Participants were selected using purposive sampling based on their involvement in the workshop design and their use of Generative AI tools. Saturation was achieved after three key informants were interviewed, representing different roles: speaker, chief organizer, and content committee.

Primary data were collected through semi-structured interviews guided by Human-Computer Interaction (HCI) theory, focusing on aspects such as usability, cognitive load, trust, and user experience. Additional data were collected through direct observation of the workshop implementation and a training needs analysis (TNA) survey using Google Forms. Secondary data included workshop documentation, training modules, presentation slides, and internal policy documents.

The interview protocol addressed 18 indicators adapted from HCI theory [22], while the observation protocol captured participant engagement, material delivery, and assessment methods. Document analysis supported triangulation by offering contextual and organizational background [23].

Thematic analysis was used to process qualitative data, with coding and theme identification guided by the research questions. The analysis followed three steps: (1) data condensation—filtering and categorizing relevant information, (2) data display—structuring data in narrative and tabular formats, and (3) conclusion drawing—identifying emerging themes and refining them through iterative analysis.

To ensure the credibility of the findings, the study applied multiple triangulation techniques, including methodological triangulation (interview, observation, document analysis), source triangulation (cross-checking responses from different roles), and member-checking (validating interpretations with participants) [24]. These strategies ensured that the findings accurately represented the participants' perspectives and minimized potential biases.

III. EXPERIMENTAL RESULT

The implementation of Generative AI in the GDGoC UM workshop played a significant role across multiple dimensions: designing workshop materials, structuring event concepts, and developing publication content. The AI tools—particularly ChatGPT, DeepSeek, and Gemini—were described by respondents as intuitive, user-friendly, and capable of reducing cognitive workload, especially during tight schedules. These tools enabled stakeholders to automate repetitive tasks, organize abstract ideas, and enhance content presentation.

For material preparation, Generative AI helped facilitators summarize existing notes, structure slide presentations, and organize learning modules efficiently. Respondent AR emphasized that while AI contributed up to 85–90% of his preparation workflow, final content still required human verification and peer validation from professionals to ensure quality. Similarly, respondent YS pointed out that prompt engineering played a crucial role in extracting relevant and practical content suggestions from AI systems.

In conceptualizing the workshop agenda, AI assisted organizers in generating initial frameworks based on thematic prompts. However, respondents unanimously agreed that AI served more as a brainstorming partner than a decision-maker. For example, AI contributed ideas for session structure, duration, and possible activities, yet final decisions were shaped by human insight, prior experiences, and collective discussions within the organizing team. This highlights the complementary, rather than substitutive, role of AI in creative decision-making.

Regarding workshop publicity, AI tools were utilized to support content ideation, including crafting copywriting for social media and promotional materials. Respondent TC reported that while AI provided a useful starting point, the outputs often lacked cultural tone, creativity, and specificity, requiring significant human revision. AI was considered to enhance creativity marginally—by an estimated 5%—but remained limited in its ability to generate contextually resonant public-facing content.

Overall, the implementation of Generative AI in this study demonstrated clear benefits in efficiency and creative structuring while underscoring the necessity of human oversight to ensure relevance, quality, and contextual appropriateness.

IV. CONCLUSION

This study examines the use of Generative AI in designing Data Analytics and Visualisation workshops within the GDGoC community at Universitas Negeri Malang. The findings reveal that Generative AI significantly improved workshop efficiency by aiding in content creation, conceptualization, and publication. While it enhanced productivity and allowed for greater idea exploration, challenges arose around the accuracy and relevance of AI-generated content, highlighting the need for human involvement in curating and validating materials. The study also noted that excessive reliance on AI could reduce creativity and critical thinking.

Ethical concerns regarding digital literacy were raised, emphasizing the need for responsible AI use in education. Future research should explore the effectiveness of AI, conduct comparative studies, and examine long-term impacts on cognitive processes, with cross-disciplinary approaches for broader insights. Ultimately, Generative AI offers considerable potential for educational transformation, but its successful application requires a balance between technology and human input.

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