

# Evaluating Effectiveness of Training Students in Prompt Engineering for Generative AI Chatbots

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**Abstract**—Generative AI technology-based chatbots like ChatGPT, Bing AI, Google Bard, etc. are used for various tasks like generating ideas, creating content, writing code, and alike. The research studies have reported the ability of Generative AI tools to help learners develop reflective and critical thinking, creativity, and problem-solving skills. While using these tools, giving effective prompts is critical for obtaining accurate and precise results. Prompt engineering is used to create and develop prompts that are useful for engaging with AI-powered tools, ensuring that these tools deliver appropriate, logical, and exact responses. The majority of studies look at how Generative AI tools might enhance education by improving concept comprehension. Existing studies explore the notion that writing effective prompts is critical to fully utilizing these Generative AI capabilities. This study determines the effectiveness of training 25 students from a Digital Marketing course to provide specific prompts to Generative AI chatbots to obtain precise and pertinent content. A mixed-method approach was used to analyze the effectiveness of the training for writing effective prompts and its impact on students' ways of writing prompts. It was observed that before training, students were utilizing AI chatbots as an information tool, but after being trained in prompting, their use of these AI chatbots transformed into a creative tool. The student feedback collected through a post-training questionnaire indicates that a vast majority of participants, 92%, felt that the training on prompts improved their skills in generating effective prompts. Furthermore, the content analysis of prompts provided by the students before and after training led to the identification of two categories of students, namely active and passive learners. These analyses highlight the importance of ensuring that students do not just passively consume AI-generated information but instead cowrite the content. The research findings, thus, highlight the importance of training students in prompt engineering for enhancing their learning experience and improving their ability to use these AI technologies.

**Keywords**—Artificial Intelligence, Chatbots, Generative AI, Prompt Engineering, Training

## I. INTRODUCTION

Social media is becoming a key component of the Digital Marketing of a variety of products and services. The Digital Marketing content needs to be made creatively to draw audiences on social media. The format of the content should be such that it improves audience engagement[1]. However, creating engaging content, such as a blog post, educational article, or Google or Facebook advertisement, is a time-consuming activity involving brainstorming and creativity. In addition, content creation for social media platforms is a time-bound task that needs to be completed by the specified deadlines.

The Artificial Intelligence (AI) technique known as "Generative AI" can create a wide range of content, including text, images, and audio. Generative AI technologies are utilized in various tasks, such as writing codes, communicating, generating ideas, and creating content. These tools benefit social media content creators by generating fresh content based on inputs. They have shown effectiveness while training students in the field of Digital Marketing. It has been found that it fosters students' interest, improves creativity, promotes active learning, and cultivates critical thinking, concept comprehension, problem-solving, and customized learning experiences[2].

But students are not aware of how to give effective prompts to get the desired response from the chatbot. Our approach to overcoming this issue is to teach students how to craft compelling prompts for Generative AI chatbots, enabling them to use these chatbots not only as information tools but also as creative tools for effective writing. To successfully integrate these chatbots into education, educators must give students instruction and support to enable them to use these technologies efficiently and increase student engagement. We intend to achieve this through a technique known as "prompt engineering," which is becoming a specialized skill for obtaining intriguing and useful responses from Generative AI chatbots.

The effectiveness of Generative AI technology-based chatbots like ChatGPT, Bing, Bard, etc. is being improved increasingly through prompt engineering. Prompt engineering is the art of structuring text that is entered into the Large Language Model (LLM) to get the desired result. Prompt engineering tends to save time and effort for students, so they can focus more on learning and execution and spend less time on content ideation and writing.

This study explores the notion that writing effective instructional prompts for AI chatbots is important for augmenting learning and teaching practice. The research question addressed in this paper is: What is the effectiveness of training students in prompt engineering for Generative AI chatbots to generate precise and creative content? Based on student responses to the post-training questionnaire and evaluating their prompts before and after teaching them prompt engineering, this study establishes the effectiveness of training students in crafting prompts. The paper presents the findings of a short-term Digital Marketing course in which students used Generative AI chatbots for content creation so that they could focus on their project work.

## II. RELATED WORK

This review of literature investigates the significance of AI in education, including the importance of AI in Digital Marketing, the benefits of employing Generative AI chatbots for creating content, and the necessity for prompt engineering to fully exploit the potential of Generative AI chatbots.

AI is becoming a significant research topic in higher education. But in higher education, the use of AI-based solutions is still very limited. The institutions need to create focused adoption strategies for AI while updating the current technology infrastructure and enhancing the AI capabilities of academic instructors[3]. The research studies analyze the development of AI tools and highlight the potential ways that Generative AI chatbots might help students learn about digital writing and other topics, such as composition and writing guidance, as well as the potential for co-creation between humans and AI[4].

AI is transforming Digital Marketing by enabling more intelligent search engines, smarter ads, refined content delivery, relying on bots, continuous learning, preventing fraud and data breaches, image and voice recognition, sales forecasting, language recognition, predictive customer service, customer segmentation, and so on[5]. The significant area under which AI can have an important impact on Digital Marketing is professional content creation[6].

With the help of Generative AI chatbots, students can engage with complicated ideas, discover new information, evaluate their comprehension, pose questions, get immediate feedback, and consider other viewpoints[7]. The best practices for crafting prompts involve considering AI chatbots as intelligent entities, adding context awareness, personalizing prompts, defining roles and styles, and utilizing suitable forms and wording[8].

Artificial intelligence and prompt engineering are integrated into an innovative field, optimizing output quality by creating efficient prompts for Generative AI chatbots. There is a need for a framework that instructs prompt writers and incorporates the principles of clarity, consistency, explicitness, reflectiveness, and flexibility. Professionals must embrace this framework for expertise in prompting[9].

The review reveals that Generative AI tools are effective when integrated into higher education, but students must be trained to utilize them before these tools can become an integral part of mainstream higher education.

## III. METHODOLOGY

This study aimed to measure the effectiveness of training students in prompt engineering for Generative AI chatbots. A ten-day Digital Marketing course was organized for 25 undergraduate female students of a degree college in India. The Digital Marketing course included training on designing a website and performing Search Engine Optimization (SEO) on the website using Google Analytics, making a personal or brand YouTube channel and posting a video, and creating an Instagram business account and a Facebook page. Students in this Digital Marketing course were required to create content such as blog entries, articles, and social media posts. Content writing is a crucial component of Digital Marketing. All Digital Marketing strategies, including Search Engine

Optimization (SEO), Pay-Per-Click (PPC) advertising campaigns, and Social Media Marketing (SMM), rely on content.

Generative AI is commonly used in Digital Marketing to streamline customer interactions, automate data analysis, create personalized marketing campaigns, and create content. Participants in this course were instructed to use Generative AI chatbots for generating content such as blog articles and posts on social media, creating Google or Facebook advertisements, writing titles and descriptions for YouTube videos, and so on. The training program was designed to guide students in producing effective instructional prompts for Generative AI chatbots in order to save time and effort spent on content writing for Digital Marketing and allow them to focus more on learning and project work. Because this is an emerging field, the instructor referred to various courses available on MOOC platforms like Coursera, edX, Udemy, etc. to train students in crafting prompts. In addition, the instructor used resources on websites like Google Cloud, Analytics Vidhya, and several YouTube videos on prompt engineering. During the training, the instructor discussed many aspects of prompting, such as clarity, conciseness, context, and adaptability. Learning resources were shared with students on Learning Management System (LMS) to further enhance training. Some of the examples of useful prompts that were discussed during the training are as below:

- Suggest keywords for the SEO of the website for the [Topic].
- Generate a 5-minute video script for a YouTube video on the [Topic].

The data provided in this study was gathered using a post-training questionnaire. Multiple-choice questions were used to assess participants' opinions of the course's usefulness, familiarity with Generative AI chatbots, the instructor's explanation of prompt engineering, and Generative AI chatbot utility in social media content generation. Additionally, the chat data, including the prompts provided by students to the Generative AI chatbot and AI-generated responses, was submitted as a document. Each prompt was analyzed as a separate unit, and the focus was more on understanding the change in pattern or style of prompting.

## IV. RESULTS AND DISCUSSION

In this section, we report the results of the effectiveness of training students in prompt engineering as evaluated by a post-training questionnaire, as well as the sorts of prompts provided to AI chatbots. A total of 130 prompts were provided to Generative AI chatbots by 25 students, and this section also discusses the comparative analysis of these prompts.

### A. Feedback Analysis from the post-training questionnaire

The data analysis of feedback gathered from students regarding the benefits of utilizing Generative AI chatbots in content writing for Digital Marketing on social media platforms and the effectiveness of prompts showed several significant findings.

1) *Confidence in applying learnings from the course:* The result showed that 68% of students were confident, and 24% were very confident in applying the skills and knowledge gained from the Digital Marketing course to their projects (Fig.1). This suggests that the Digital Marketing course was effective in helping the majority of students gain confidence in applying their newly acquired skills and knowledge to their work.

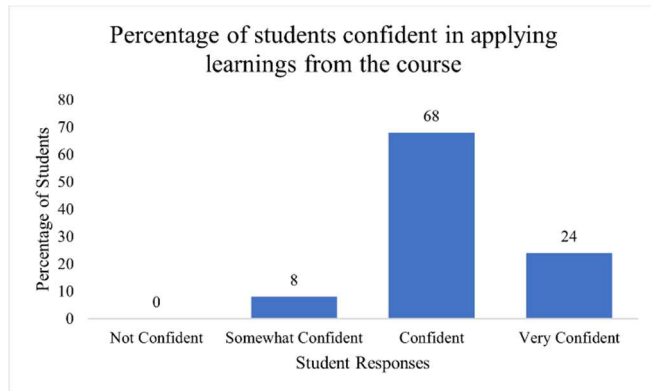


Fig.1. Percentage of students confident in applying learnings from the course

2) *Familiarity with AI chatbots before taking the course:* Based on the data provided, it seems that a majority of students were familiar with AI chatbots like ChatGPT and Bing before taking the course. Specifically, 40% were somewhat familiar, 32% were familiar, and 24% were very familiar. This indicates that many students had prior knowledge about AI chatbots before enrolling in the course.

3) *Which AI chatbot is convenient to use:* According to the feedback, 44% of students found both ChatGPT and Bing convenient for content development for Digital Marketing on social media platforms, with 32% finding Bing more convenient and 24% finding ChatGPT better. This implies that many students perceive ChatGPT and Bing to be convenient tools for content creation for Digital Marketing on social media platforms, with some students preferring one over the other.

4) *Instructor's explanation of prompt engineering:* The majority of participants, 92%, agreed that the course instructor was effective in explaining to the students how to use Generative AI chatbots to craft prompts for content generation.

5) *Improvement in prompt generation:* Combining the responses of strongly agree and agree, we find that a significant majority of participants, 92% felt that the prompt training enhanced their skills in generating effective prompts using AI tools (Fig.2). This suggests that the training was effective in helping students develop their skills in this area.

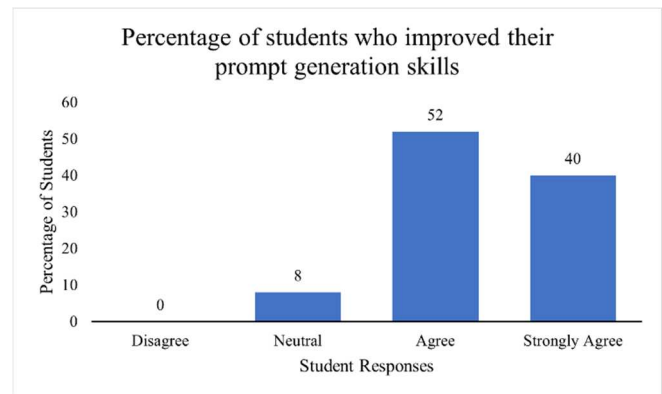


Fig.2. Percentage of students who improved their prompt generation skills

6) *Usefulness of AI chatbots:* Based on the feedback data, most students find AI chatbots for content creation for Digital Marketing on social media platforms useful. Specifically, 36% said they found it very useful, 44% said they found it useful, and 20% said they found it somewhat useful (Fig.3). This suggests that AI chatbots are a valuable tool for content creation in Digital Marketing on social media platforms.

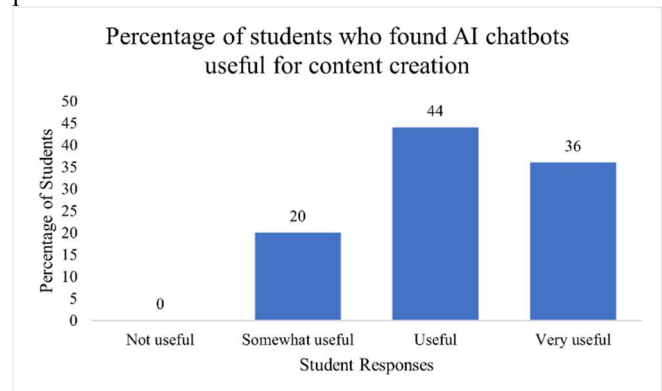


Fig.3. Percentage of students who found AI chatbots useful for content creation

7) *Likely to use AI chatbots in the future:* According to feedback data, the majority of students are likely to use AI chatbots for their own Digital Marketing projects or work in the future. Specifically, 36% said they were very likely to use AI chatbots, 56% said they were likely to use them, and 8% said they were somewhat likely to use them (Fig.4). This suggests that there is a high level of interest in using AI chatbots for Digital Marketing projects or works in the future.

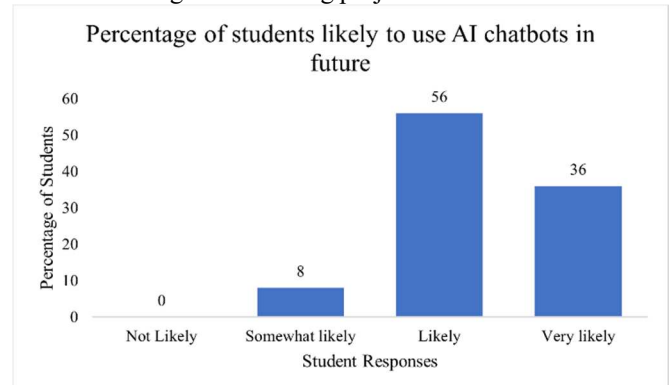


Fig.4. Percentage of students likely to use AI chatbots in future

## B. Comparative Analysis of Prompts

The prompts used by students to produce the social media content enabled researchers to evaluate the effectiveness of teaching them prompt engineering. The comparative analysis of prompts (TABLE I) provided by students revealed that prior to being trained in prompt engineering, students used brief prompts of 3–4 words. However, after training, they started interacting with AI chatbots using longer, more descriptive prompts. Similarly, prior to training, students were not specific when giving prompts for obtaining information from AI chatbots. However, the students' prompts following training were more focused on the topic of their interest. The analysis further revealed that before training, students used Generative AI chatbots as an information tool, but after training, their use of these AI chatbots evolved into a creative tool.

TABLE I. COMPARATIVE ANALYSIS OF PROMPTS

<b>Length of prompts before training (Short)</b>
<ul style="list-style-type: none"><li>• Tips for perfect skin.</li><li>• Lines on fast food.</li><li>• About Kasol.</li></ul>
<b>Length of prompts after training (Long)</b>
<ul style="list-style-type: none"><li>• Suggest a description for the Facebook page on healthy lifestyles.</li><li>• I am having a nail studio, and I want a poster for my Facebook page.</li><li>• Create an article outline for canvas art. Make it concise, yet leave no information.</li></ul>
<b>Prompts before training (General)</b>
<ul style="list-style-type: none"><li>• Types of warm-up exercises.</li><li>• Why is denim trending?</li><li>• Any art quote.</li></ul>
<b>Prompts after training (Specific)</b>
<ul style="list-style-type: none"><li>• Description of a skincare routine with two wonderful and amazing lines.</li><li>• Generate a Google Ad for yoga classes with 3 headlines and 2 descriptions.</li><li>• Suitable Instagram captions and hashtags for a fashion brand.</li></ul>
<b>Prompts before training (Informative)</b>
<ul style="list-style-type: none"><li>• History of Indian classical dance forms.</li><li>• Content for the Indian dance form.</li><li>• Tell me more about the changing landscape of Indian classical dance forms.</li></ul>
<b>Prompts after training (Creative)</b>
<ul style="list-style-type: none"><li>• Give me a valid hashtag about Indian dance forms.</li><li>• Suggest keywords for the SEO of the website for Indian dance forms.</li><li>• Write a suitable title and description for a YouTube video on Indian classical dance.</li></ul>

In addition, two types of learners, active and passive, were identified through a comparative analysis of the prompts. The analysis of prompts provided by students to AI chatbots was done based on parameters such as prompt length, specificity, and creativity. This content analysis of prompts showed that 92% of students utilized Generative AI chatbots as creative tools, crafting effective prompts and enhancing creativity. The post-training feedback and comparative analysis of prompts used by the students prove that training students in

prompt engineering helped them create goal-oriented content and gave scope for more creativity rather than struggling for content only.

## V. CONCLUSION

Prompt engineering training was provided to the students to address difficulties discovered while developing content for Digital Marketing. The effectiveness study of our training was done in terms of prompts provided to Generative AI chatbots. The analysis of feedback and prompts reveals that the students' main takeaway was that they were able to craft effective prompts required to generate precise and relevant content. Thus, according to students' positive responses (92%), it can be claimed that training students in prompt engineering has been successful in addressing the challenge of developing effective prompts. This research highlights the importance of training students in crafting prompts to integrate Generative AI chatbots into education and various fields effectively. By doing so, students can learn to communicate with AI chatbots in a way that elicits accurate and relevant responses, thereby enhancing their learning experience and improving their ability to use AI technology in their future careers.

This study is limited to a single short-term course. As a result, in order for the study's findings to be generalized, this training could be implemented in a variety of educational contexts. Also, as part of our future work, we intend to design learning strategies for training students in prompt engineering who have been identified as passive learners so they can actively engage with the Generative AI tools in creating the content rather than just passively consuming AI-generated information.

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