

Research

Developing effective prompts to improve communication with ChatGPT: a formula for higher education stakeholders

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Received: 16 November 2023 / Accepted: 15 April 2024

Published online: 29 April 2024

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Abstract

The escalating integration of artificial intelligence (AI) technologies, particularly the widespread use of ChatGPT in higher education, necessitates a profound exploration of effective communication strategies. This paper addresses the critical role of prompt development as a skill essential for university instructors engaging with ChatGPT. While emphasizing the practical implications for higher education, the study introduces a novel two-layered AI prompt formula, considering both components and elements. In methodology, the research synthesizes insights from existing models and proposes a tailored approach for ChatGPT, addressing its unique characteristics and the contextual elements within higher education. The results highlight the formula's flexibility and potential applications in diverse fields, from syllabus planning to assessment. Moreover, the study identifies limitations inherent in ChatGPT, emphasizing the need for instructors to exercise caution in its usage. In conclusion, the paper underscores the evolving landscape of AI in education, envisaging specialized versions of ChatGPT for academic settings and advocating for the proactive adoption of ethical frameworks in the use of AI in higher education. This study serves as a foundational contribution to the discourse on effective AI communication in educational settings.

Keywords Artificial intelligence · Chatbots · ChatGPT · Higher education · University instructors

1 Introduction

AI is integrated into various dimensions of education and some instructional technologies such as chatbots, intelligent tutoring, adaptive assessment tools, and automated grading systems use this technology to facilitate the process of instruction and learning. The affordance of AI models to instructors and students are noteworthy. Crompton and Burke [6] believe that AI can adapt instruction to the needs of individual learners, suggest interactive teaching activities, provide customized feedback, and predict academic success.

ChatGPT, which is developed by Open AI company, is a Large Language Model (LLM) that utilizes a robust machine learning software called Generative Pre-trained Transformer (GPT). ChatGPT relies on a large corpus of data such as texts and images retrieved from the internet and suggests appropriate texts in response to user's prompts with a realistic interaction [16]. It has numerous functions from both general and domain-specific perspectives, such as generating responses to questions, revising and editing content, creating creative texts such as poems, and summarizing and synthesizing information in its chat sessions. In academia, text-based applications such as Microsoft Word, Google Translate,

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and Grammarly have been continuously used by university educators. However, faculty members could use ChatGPT for more task-oriented functions such as to upgrade their syllabi, lectures, assignments, and grading rubrics. Students mainly use this application to complete their assignments and writing projects, and university staff could use it to offer better communication services.

Hence, the strategic integration of advanced AI models like ChatGPT in academia, as highlighted by Alenizi et al. [1] and Escamilla-Gil [8], can notably improve education and teaching by tailoring learning experiences, optimizing instruction, and creating an engaging environment for both students and educators. Additionally, Toner [23] underscores the role of AI models such as ChatGPT in international education, enhancing accessibility and support for students during application procedures and communication across various time zones.

According to Rospigliosi [20], ChatGPT offers an interactive learning environment that provides appropriability, evocativeness, and integration. Appropriability allows users to take ownership of the learning process by asking questions and receiving tailored responses. Evocativeness promotes awareness by enabling users to enter into conversations that deepen their understanding of topics. Integration enriches users' knowledge by exploring multiple concepts. Similarly, Celik et al. [5] suggest that instructors can use AI for creative planning, implementation, and assessment. During the planning stage, AI can help instructors familiarize themselves with students' backgrounds, decide learning outcomes, and plan appropriate activities. During implementation, AI can monitor progress, reduce teacher workload, make teaching more interesting, and increase collaborative learning. Finally, AI can be used for automated evaluation during the assessment phase, providing more efficient methods of grading and feedback.

In syllabus design, a major step in planning, university instructors can use ChatGPT to generate new ideas for their courses by asking it to suggest topics, subtopics, readings, or resources [12]. Herft continues that during teaching, ChatGPT can answer student questions, generate discussion or writing prompts, and provide personalized feedback to students (2023). In assessment, instructors can use ChatGPT to generate exam or assignment prompts, multiple-choice questions and grade assignments by providing feedback on the quality of student work.

To ensure proper use of AI systems, especially ChatGPT, universities could use a pedagogical, proactive approach rather than a reactive, punitive one by creating policies, monitoring the trends, and offering training and development practices for stakeholders. Faculty members should learn how to communicate with ChatGPT and become familiar with its mechanism through creating appropriate prompts. The present paper centers around the development of prompts, with a particular emphasis on ChatGPT, and explores their application in higher education through the stages of planning, implementation, and assessment. Accordingly, the research questions guiding this investigation are as follows:

1. How does ChatGPT influence syllabus design by aiding instructors in generating innovative ideas for courses?
2. In what ways does ChatGPT enhance teaching practices, student engagement, and collaborative learning during the implementation phase in higher education?
3. What are the implications of ChatGPT for automated evaluation and feedback, and how does it contribute to efficiency in grading during the assessment phase?

These questions align with the following hypotheses:

1. The use of ChatGPT in syllabus design positively correlates with the generation of diverse and relevant ideas for courses
2. ChatGPT's integration during the implementation phase positively influences teaching practices, student engagement, and collaborative learning
3. ChatGPT's application for automated evaluation in the assessment phase improves grading efficiency and enhances the quality and timeliness of feedback provided to students

2 Theoretical foundation

An AI prompt refers to a set of instructions or commands that users can input into an AI system to communicate their intentions to the machine [18]. In the case of a language model like GPT, the prompt could be a sentence fragment that the model is required to provide a response. The AI system will then analyze the input, draw from its vast database of knowledge, and generate a continuation of the sentences. When prompts are clear, ChatGPT understands the user's true intentions and produces more accurate and informative responses, resulting in more meaningful conversations and

faster, more accurate predictions [6]. Additionally, prompts can be used to guide the conversation in a certain direction or to set expectations for the type of information or response desired by the user. For example, a prompt that includes specific keywords or phrases can help ChatGPT narrow down the topic and provide a more targeted response. Therefore, taking the time to learn and create rich prompts can help ensure more efficient and effective interaction with ChatGPT. Unclear prompts, on the other hand, can lead to misleading or irrelevant responses. Overall, investing time in developing effective prompts can enhance the efficiency and effectiveness of interactions with ChatGPT.

2.1 General versus field-specific prompts

The level of specificity and relevance to a particular field distinguishes field-specific prompts from general prompts. General prompts are broad and open-ended, generating responses on a wide range of topics, while field-specific prompts are tailored to a particular subject area or discipline, generating more accurate and relevant responses [10]. Field-specific prompts require more specific information about the topic or field and may include terminology, concepts, or theories unique to that domain. For example, a general prompt might be “What are some effective teaching strategies?” whereas a field-specific prompt might be “What are some effective strategies for teaching marketing to undergraduate students?” These prompts can provide valuable guidance and information to university instructors seeking advice on topics unique to their discipline or subject area.

2.2 Proposed AI & ChatGPT prompts formula

The effectiveness of an AI prompt lies in its ability to inspire users to create personalized and unique content without requiring excessive post-processing. Ramlochan [18] has identified key characteristics that make an effective prompt, such as clarity, specificity, context, appropriate tone, and conciseness and refers to some common components and elements while developing AI prompts. The common components in his model are task, instructions, context, parameters, and input followed by 17 elements to provide more necessary information to AI applications. Another model proposed by Barret [4], known as CREATE, focuses on enhancing prompt development skills by referring to key components such as clarity, relevance, examples, avoid ambiguity, tinker (testing and refining the prompt through multiple interactions), and evaluate. The author believes that this can act as a checklist for crafting general prompts (2023).

While both models offer valuable guidelines for prompt generation, Ramlochan’s model with its extensive list of components and elements may present challenges and complexity that could render the prompt generation task unfeasible, especially considering current limitations. For instance, one element in Ramlochan’s model suggests inserting images into the AI model, which is currently unavailable in the context of ChatGPT. Furthermore, some elements are primarily designed for other AI models, such as DALLE-2 and Codex, making them less suitable for ChatGPT (2023). The elements introduced in the latter model by Barret [4] are mainly for general prompt development and act as universal guidelines. By considering the potentials and weaknesses of the previous models, this article introduces a more straightforward and practical model, specifically proposed for ChatGPT, that takes into account the rhetorical situation elements [13] in higher education. This novel formula fills a gap by offering a more classified and useful approach for prompt generation in both academic and general contexts.

The proposed formula for ChatGPT prompts consists of two levels: components and elements. At the higher level, the building blocks or foundation of any AI prompt are the Task, Context, and Instructions (TCI). The Task refers to the specific action or process that an AI model is trained to perform in response to a prompt. Context provides additional information about the task to help the AI model understand the situation and goals. Instructions are the specific steps or actions required to complete the task or achieve the desired outcome. Referring to the element level, these are the blocks to make up the components. The five elements of Role, Audience, Tone, Examples, and Limits (RATEL) shape the element layer. Role refers to the attribute given to AI such as a faculty member, a doctor, or a storyteller. Audience defines the target individual or group for the prompt. Tone specifies the attitude of the prompt. Examples provide guidance for the AI to generate relevant and similar content. Limits set boundaries to ensure more specific outcomes. Figure 1 depicts the proposed AI prompt formula, while an exemplification of a prompt derived from the formula, along with its subsequent analysis, is presented in Table 1. Subsequently, the formula will be applied in the context of education in the following sections of this paper.

Fig. 1 ChatGPT prompt development formula

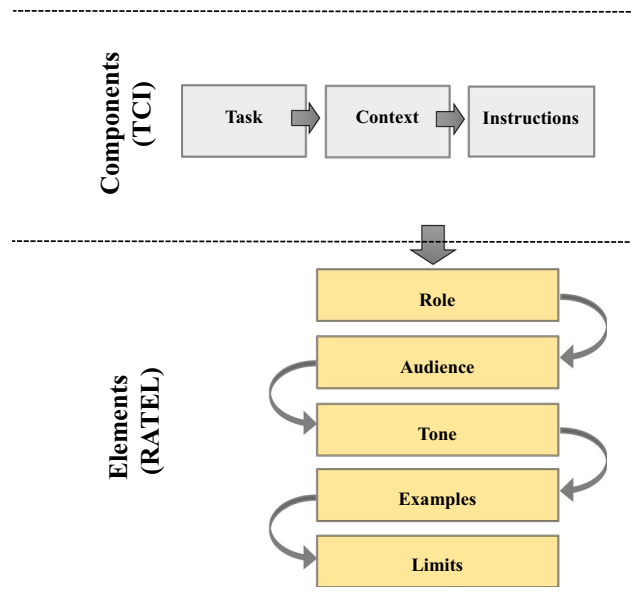


Table 1 Prompt example

Imagine you are a faculty member. Write a blog article on the gig economy from the perspective of a faculty member addressing his/her undergrad university students. This article will be published in the university's monthly newsletter. Add a thesis statement in the introduction part and use headers for each specific point. Provide appropriate examples to support your claims, too. For example, you can talk about gig jobs university students have while studying. Writing should be intimate and friendly. Also, use emotive language that promotes emotional ties. This article should be at least 500 words. Do not use overly technical or jargon words

Prompt analysis based on the formula

Components (TCI)	Task:	Write a blog article
	Context:	On the gig economy ... monthly newsletter
	Instructions:	Add a thesis ...your claim, too
Elements (RATEL)	Role:	Faculty member
	Audience:	University students
	Tone:	Writing should be ... emotional ties
	Example:	You can talk ... while studying
	Limits:	500 words/Do not use overly technical or jargon words

This table is the authors' own creation, illustrating an exemplification of a prompt derived from the proposed AI prompt formula and its subsequent analysis based on the components and elements outlined in the table above

The prompt formula introduced in this article could be a valuable tool for generating effective prompts in both general and field-specific contexts. This formula provides a systematic approach for creating prompts that are tailored to specific goals, contexts, and audiences. In addition, it is flexible and can be customized to suit individual needs and preferences. ChatGPT users can experiment with different orders and combinations of components and elements, or choose to exclude certain items altogether. This allows for a high degree of flexibility in tailoring prompts to specific needs. By leveraging the components and elements of this formula, ChatGPT users can create prompts that inspire creativity and personalization, while minimizing the need for post-processing. The potential applications of this formula are vast, ranging from educational and academic settings to business and industry. Therefore, it could represent a significant contribution to the field of AI, with the potential to revolutionize the way we communicate with AI models.

2.3 AI prompts in higher education

To enhance the effective use of ChatGPT prompts in higher education, several essential factors should be taken into account. Firstly, a clear and specific question is indispensable to ensure accurate and relevant responses from ChatGPT. Secondly, the use of field-specific prompts with concise language and a clear context is crucial in generating detailed and precise responses. Thirdly, prompts should be refined to customize responses to specific needs, and instructors should critically evaluate all responses to ensure their suitability for the situation [10]. By integrating these factors into their use of prompts, university faculty members can capitalize on the benefits of this technology while supplementing their own knowledge and experience. The following sections will outline how university instructors could develop ChatGPT prompts for planning, implementation, and assessment purposes.

2.3.1 ChatGPT prompt development: planning stage

In higher education, the design of syllabi plays a critical role in course planning. Parkes and Harris [17] highlight three primary functions of a syllabus as a contract, a permanent record, and a learning tool. Typically, syllabi include learning objectives, course outlines, teaching and learning methods, assessment and evaluation methods, and course policies. University teachers are often responsible for both designing and presenting their syllabi in their classrooms.

ChatGPT can assist instructors in planning their syllabi by identifying key learning outcomes and offering suggestions on course content and structure. In addition, it can provide information on different pedagogical approaches, such as project-based learning, flipped classrooms, and collaborative learning, to help instructors determine the most appropriate approaches for their courses. By analyzing existing syllabi, ChatGPT can provide recommendations based on its vast knowledge base, as well as generate new ideas and offer fresh perspectives. Furthermore, ChatGPT can provide instructors with templates and examples to support them in designing their syllabi. However, it is essential to note that despite the benefits of using ChatGPT for syllabus design, it is ultimately the instructors who should evaluate the quality of the responses based on their expertise and experience [9].

The appropriate prompts for syllabus design are expected to be specific, relevant, reflective, actionable, research based, and inclusive [17]. Prompts can request ChatGPT to generate specific topics and components for each course followed by relevant assignments. The term relevance implies that each topic, reading, and assignment should align with the course objectives and be relevant to students' interests and needs. Reflective prompts involve thoughtful consideration of one's teaching philosophy and past teaching experiences. Actionable prompts could generate clear and achievable syllabus items. To be research-based, prompts can seek current research and best practices in teaching and learning. Finally, prompts should be inclusive and consider the diverse backgrounds, experiences, and identities of students in the class.

This section presents an illustrative example of how the CTI and RATEL prompt formula introduced earlier in this paper can be used to generate a prompt for an undergraduate course in Business Studies, specifically for the course Communication 140. This course is being taught at University Canada West (UCW) in Vancouver, Canada and equips students with the skills to create impactful workplace communication, incorporating effective written and oral presentations, visual design, and media integration to meet the needs of various contexts and audiences. The textbook used for this course is *Communicating for Results*, written by Carolyn Meyer and published in 2020. Table 2 provides a prompt example for the planning stage. See Appendix A for the ChatGPT response.

As shown in the table above, the prompt focuses on a specific section *Weekly Class Activities* related to the course material. The prompt is structured in a way that adheres to the CTI and RATEL formula, which emphasizes the importance of providing clear and concise instructions, as well as prompting students to engage in higher-order thinking. By utilizing this formula, instructors can design prompts that are tailored to the specific learning objectives of their course, while also promoting critical thinking and engagement with the course material.

2.3.2 ChatGPT prompt development: implementing stage

The intersection of teaching and AI is a multifaceted and complex relationship. AI has the potential to revolutionize the teaching and learning processes in higher education by alleviating the workload of educators, aiding them in lesson planning, classroom activities, and providing them with feedback. Celik et al. [5] reported that teachers benefited from an AI-based peer tutor recommender system and saved time for other activities and emphasized that AI can analyze

Table 2 Planning stage prompt example

I'm a faculty member teaching Communication 140 "Business Communications" course to international undergraduate students at a university. I want you to provide suggestions and recommendations to improve one major section "Weekly Class Activities" in my current syllabus

Imagine you are an expert in higher education syllabus design. Suggest one interactive learning activity for weeks 1 and 2 by referring to active learning strategies (engagement, interaction, and feedback) to engage students along with considering diversity and inclusion practices to accommodate international students with diverse backgrounds. The focus of week 1 is on "Issues and Trends in Professional Communication"; and week 2 is "Memorandums, E-mail, and Routine Messages"

Make sure each learning activity has these components: a description, procedures, an example, and tips. Use a header for each week and the desired activities with their components. Use a friendly and approachable tone while introducing the activities to the students. Avoid using overly technical language or jargon and unnecessary information while suggesting the activities

Syllabus design prompt analysis based on the CTI & RATEL formula

Components (TCI)	Task:	I want you to provide ... current syllabus
	Context:	I'm a faculty member... at a university The focus of week 1 ... <i>Routine Messages</i> "
	Instructions:	Suggest one interactive ... diverse backgrounds
Elements (RATEL)	Role:	Imagine you are an expert in higher education syllabus design
	Audience:	international undergraduate students at a university
	Tone:	Use a friendly and ... activities to the students
	Example:	Not available!
	Limits:	Avoid using overly ... the activities

This table is the authors' own creation, illustrating the application of the CTI and RATEL prompt formula in syllabus design for an undergraduate Business Studies course

large datasets, recognize patterns and trends, and offer personalized feedback to students. This can assist instructors in customizing their instruction to meet individual learners' needs and identifying areas where students may be struggling.

In particular, ChatGPT can be a valuable tool in facilitating teaching and learning processes by generating discussion and follow-up questions on the subjects covered in the course [9]. This is especially beneficial for new instructors or those seeking novel ideas to spark class discussions and encourage collaboration through follow-up questions. The authors continue that ChatGPT has the potential to help students conduct research on a given topic. For example, it can generate a list of relevant keywords, suggest appropriate resources and articles, and summarize key arguments and ideas, saving students time and allowing them to focus their research efforts. ChatGPT can create interactive learning activities like quizzes and games to engage students and test their comprehension of important concepts. It can also personalize the learning experience by analyzing students' performance on assignments and suggesting additional reading and resources based on their interests and learning style. Additionally, teachers can leverage AI as an opportunity for professional development, enhancing their teaching skills while working with AI. AI-powered training modules can offer teachers customized feedback and suggestions based on their individual strengths and weaknesses.

In the implementation phase, the focus of our prompt generation will be on beginning a class at university. Typically, university instructors prepare open-ended questions related to students' personal life or interests as a warm-up exercise before beginning their lectures. This approach helps to engage students by activating their prior knowledge and minimizing distractions, promoting inclusivity and collaboration by encouraging students to establish shared expectations. The example prompt presented in this section is for a course in MBA studies at UCW, specifically the Talent Management course, which covers two main concepts of Organizational Behavior and Human Resource Management. The course textbook used is the Canadian Organizational Behavior by McShane et al. [15]. University instructors can use the CTI and RATEL prompt formula presented in this paper to create prompts for ChatGPT to generate warm-up questions for the first chapter of the textbook, *Introduction to the Field of Organizational Behavior*. Table 3 illustrates a prompt example followed by the analysis of its components and elements. The response generated by ChatGPT for this prompt is provided in Appendix B.

Table 3 Implementation stage prompt example

Imagine you are a faculty member at a university. You are going to design some questions to begin this session in the course Organizational Behavior. This course is for international MBA students who are mainly from Asia and Latin America with diverse backgrounds and interests. The textbook you are using is Canadian Organizational Behaviour by McShane et al. (Eleventh Edition, published 2021). This class is being prepared on the chapter 1 of this textbook. These are the learning objectives mentioned in this chapter:

1. Define organizational behaviour and organizations
2. Explain why organizational behaviour knowledge is important for you and for organizations
3. Discuss the anchors on which organizational behaviour knowledge is based
4. Summarize the workplace trends of diversity and the inclusive workplace, work–life integration, remote work, and emerging employment relationships
5. Describe the four factors that directly influence individual behaviour and performance
6. Summarize the five types of individual behaviour in organizations

Design 5 warm-up questions to be asked at the beginning of the class! Make sure the questions are based on the learning objectives and concepts discussed in this chapter. For example, a question can be “Have you ever been in a work-related situation where you were affected by personality conflicts with a colleague?” Try to use a friendly, motivational tone. Make sure your questions are inclusive and related to students’ backgrounds and real-life experiences. Do not create long questions; do not use technical words

Implementation stage prompt analysis based on the CTI & RATEL formula

Components (TCI)	Task:	You are going to design ... Organizational Behavior
	Context:	The textbook you are using ... individual behaviour in organizations
	Instructions:	Design 5 warm-up ... in this chapter
Elements (RATEL)	Role:	Imagine you are a faculty member at a university
	Audience:	This course is ... and interests
	Tone:	Try to use a friendly, motivational tone
	Example:	Have you ever been ...with a colleague?”
	Limits:	Make sure your ... use technical words

This table is the authors’ own creation, showcasing the CTI and RATEL prompt formula application for designing inclusive warm-up questions in an MBA course on Organizational Behavior

The integration of ChatGPT into higher education has the potential to revolutionize the way in which instructors teach and students learn. However, it is essential for instructors to be aware of the limitations of the tool and to use it judiciously, as a supplement to, rather than a replacement for, human teaching. While AI can assist with many aspects of teaching, it is not a substitute for the unique human interaction and creativity that instructors bring to the classroom. As AI technology advances and becomes more integrated into higher education, it is important for instructors to remain informed and adaptable, balancing the benefits of AI with the value of traditional teaching methods to create the most effective and well-rounded educational experience for their students.

2.3.3 ChatGPT prompt development: assessment stage

The use of AI in assessment and feedback plays a crucial role in enhancing student success in higher education. Assessment involves the process of evaluating students’ performance and understanding of course content, while feedback provides information to students about their strengths, weaknesses, and areas for improvement. The authors add AI-powered assessment and feedback systems utilize machine learning algorithms to provide immediate, valid, and personalized student feedback, resulting in improved performance and engagement. These AI applications have the potential to improve the effectiveness and efficiency of assessment and feedback processes in higher education, but they also raise concerns about reliability, fairness, and ethical implications that need to be carefully considered and addressed [21].

One promising application of AI in assessment and feedback is the use of ChatGPT. ChatGPT has the ability to generate text-based responses to prompts, making it a potential tool for providing automated feedback to students. Sok and Heng [21] highlight that ChatGPT can engage in interactive conversations with students, providing instant feedback on their assignments, answering questions, and guiding their learning process. In addition, Chat GPT can help university teachers generate formative and summative assessments that test students’ knowledge and understanding of the material covered in the course. Chat GPT can analyze data from formative assessments and other assignments to identify

patterns in student performance. The model can also provide personalized feedback based on students' strengths and weaknesses [3]. Atlas [2] state that Chat GPT can also analyze student writing assignments and provide grammar, syntax, and vocabulary feedback. However, it is important to note that ChatGPT is not a substitute for human instructors, and careful consideration should be given to issues related to bias, fairness, and privacy in using ChatGPT [21]. Although it can analyze student writing assignments with the provision of feedback, its use should be balanced with traditional assessment measurements to provide the most effective and well-rounded educational experience for students.

Table 4 Assessment stage prompt example

Imagine you are a university instructor teaching an academic writing course to undergraduate students from different disciplines. You are going to read a writing assignment and give your feedback, a mark, and some suggestions for improvement. One of your students has submitted this final draft of a literature review assignment with the topic "The Integration of Social Media in Higher Education". The rubric provides you with six important areas in academic writing with related questions:

1. Context of and Purpose for Writing
 - Did the student demonstrate adequate consideration of context, audience, and purpose and a clear focus on the assigned tasks?
2. Content Development
 - Did the student use appropriate, relevant, and compelling content to explore ideas within the context of the discipline as well as a thorough analysis and synthesis of literature?
3. Control of Syntax (e.g. lexical and grammatical use)
 - Did the student use correct word choice, spelling, and punctuation? Did the student use correct synonyms by considering appropriate tone and style?
4. Control of Mechanics (e.g., coherence, cohesion)
 - Did the student demonstrate consistent use of various connectors and pronouns to link ideas throughout the writing and shape the flow with clarity?
 - Did the student make sure each paragraph has a well-developed central idea with logical groupings of articles?
5. Source and Evidence
 - Did the student demonstrate consistent use of credible, relevant sources to support ideas that are suited within the discipline and genre of the writing?
6. Formatting (APA 7th edition)
 - Did the student apply APA formatting throughout the written work consistently and accurately including body paragraphs, headings, and in-text citations?

Now, do the following items:

- Use separate headers for each of the above six rubric areas and provide 1 short reflective comment for each
- Based on your comment, give a mark out of 100 for each area
- Under a header entitled "Suggestions", provide 1 suggestion on how the student can improve this category and introduce one useful source on the internet with the access link if necessary
- At the end, consider all the categories and give a total mark out of 100 with a short paragraph of final remarks

An example of your feedback could be:

"You have demonstrated consistent use of various connectors and pronouns to link ideas throughout this paragraph. However, the central idea needs to be more developed"

Remember that university undergrad students are reading your comments, so try to use an approachable tone and avoid using technical expressions. Also, use both constructive and positive comments. Here is the essay (Copy/Paste the draft)

Assessment stage prompt analysis based on the CTI & RATEL formula

Components (TCI)	Task:	You are going to read ... for improvement
	Context:	One of your students... with related questions:
	Instructions:	Now, do the following items: ... paragraph of final remarks
Elements (RATEL)	Role:	Imagine you are a university writing instructor
	Audience:	undergraduate students from different disciplines
	Tone:	approachable tone
	Example:	"You have demonstrated ...more developed"
	Limits:	avoid using technical expressions...positive comments

This table illustrates the CTI and RATEL prompt formula applied in assessing a student's final draft for a literature review assignment in an undergraduate Critical Analysis and Writing course

The prompt presented on the assessment stage pertains to an undergraduate course of Critical Analysis and Writing (ENGL 102) at UCW. Specifically, the prompt asks ChatGPT to evaluate a student's final draft submission for the Literature Review assignment, with the aid of a provided rubric. The topic of this literature review was *The Integration Social Media into Higher Education*. ChatGPT is required to offer reflective comments, and support these comments with examples from the draft, mark the work, and provide suggestions for improvement, culminating in a total mark. Table 4 illustrates the prompt content, and the CTI and RATEL formulas are used to analyze the prompt. See Appendix C for ChatGPT response.

3 Discussion

In higher education, university instructors are encouraged to utilize ChatGPT with a clear purpose in mind, as this will enable them to craft more specific and efficacious prompts. To obtain different perspectives on a topic, it is advisable to utilize both general and field-specific prompts. Subsequently, refining these prompts based on feedback received from ChatGPT will allow instructors to obtain more accurate and relevant responses in the future. It is important for instructors to critically evaluate the responses received and utilize their professional expertise and judgement to determine the best course of action. ChatGPT should be regarded as a tool that supports the work of instructors, rather than as a substitute for their professional expertise.

Prompt development, as discussed in the three areas of planning, implementation, and assessment, can be tailored to specific fields within higher education, including the humanities, social sciences, and STEM fields. ChatGPT should be used in a clear and concise manner at any stage of use to enable it to understand the request and provide relevant responses. Providing context will enable ChatGPT to understand the situation and provide appropriate guidance, and The CTI and RATEL formula can be utilized to design effective prompts. While instructors may find the planning and implementation stages more convenient for prompt development, the assessment phase requires greater precision and control over the responses generated.

Despite the potential educational benefits of using ChatGPT, there are several limitations to its use in higher education. First, while it can generate clear and engaging syllabi, it needs to better address the individual needs and learning styles of students, particularly those from diverse cultural backgrounds [9]. Second, ChatGPT may fail to recognize cultural references and terms, leading to incomplete responses or insufficient feedback. In order to optimize its use in teaching activities, instructors should review and modify the response generated by ChatGPT before utilizing it [22]. Moreover, it lacks a deep level of understanding, particularly in field-specific domains, and its database is limited to knowledge published before 2021 [7]. Fourth, existing bias in model training and algorithm design may result in biased responses. This can be particularly problematic in educational settings, where biases can negatively impact students' experiences and learning outcomes [9]. Finally, the emergence of AI applications like ChatGPT raises concerns about online assessment security and plagiarism in online exams, threatening academic integrity [11]. Although human-like texts generated by ChatGPT have been efficient in various subjects, these limitations should be carefully considered before implementing it in higher education.

This study meticulously justifies its findings by grounding them in the theoretical foundations outlined in the earlier sections. For instance, it leverages insights from Ramlochan [18] regarding the effectiveness of AI prompts, as well as Friesen [10] on the distinction between general and field-specific prompts. Additionally, the study aligns its conclusions with the proposed AI & ChatGPT Prompts Formula, drawing on the work of Barret [4] and Jory [13] to craft effective prompts for ChatGPT interactions.

To enhance the efficiency of prompt development, instructors may consider Chained Prompting and Summary Elicitation. Chained prompting involves dividing complex tasks into immediate and manageable tasks for the AI machine instead of a long prompt [19]. Through this procedure, ChatGPT can generate more concrete and customized results.

It is time-saving for instructors as they can make necessary adjustments along the way if the model is not generating relevant responses. For example, when generating a prompt through the CTI and RATELF formula, instructors can write the three components (Task, Context, Instructions) in one prompt, and then add the five elements in the coming prompts. Summary Elicitation is when instructors ask the application to summarize its responses, especially when they are lengthy. This feature can save time and make it easier for the user to digest the information presented by ChatGPT. Additionally, the summarization feature can help users better understand and retain the information provided by the AI system, ultimately enhancing the overall user experience without having to read through the entire response again.

Additionally, it is imperative to acknowledge potential biases and limitations inherent in both AI models, particularly ChatGPT, and the proposed approach outlined in this study. Firstly, it is essential to recognize that ChatGPT, like any AI model, may exhibit biases derived from the data on which it was trained. The large corpus of internet-based information may inadvertently introduce biases present in the data sources, impacting the model's responses. This potential bias could manifest in the generation of prompts and responses, influencing the educational content and perspectives presented by ChatGPT. Moreover, limitations associated with the proposed ChatGPT prompt formula should be acknowledged. While the formula aims to provide a practical and classified approach to prompt generation, it may not address all potential challenges. The simplicity of the model, while enhancing usability, may inadvertently neglect certain nuances in prompt development, impacting its effectiveness in diverse educational settings. This study could benefit from a more extensive discussion on the development and testing of the product. Examining its efficacy across various educational contexts and evaluating its performance against a range of scenarios could enhance the generalizability of the proposed approach.

4 Future research in prompt development

The field of AI prompt development and engineering presents a vast array of potential research areas for the future. One promising area is the advancement of natural language processing models to generate personalized prompts tailored to individual learners' needs and abilities. These prompts have the potential to optimize learning experiences and improve educational outcomes.

In the realm of educational technology, the integration of AI-generated prompts is particularly impactful, notably in online courses and remote learning environments [14]. Khalil's exploration highlights how tailored AI prompts can dynamically adapt to individual learning styles, enhancing student engagement and interaction. For example, in online courses, this adaptability fosters real-time personalization, potentially deepening comprehension and improving learning outcomes. Moreover, in remote learning, AI-generated prompts act as virtual guides, facilitating sustained student interaction and collaboration beyond traditional classroom settings, reshaping the landscape of modern education [14].

Furthermore, researchers could explore the ethical implications of using AI-generated prompts, including issues related to bias, privacy, and accountability. Tlili's [22] study on AI-generated prompts highlights the importance of looking closely at ethical aspects like bias, privacy, and accountability. Researchers need to address practical concerns, particularly regarding possible differences in how diverse student groups are represented due to biases in the training data. Privacy adds complexity to the ethical discussion, requiring researchers to carefully handle student data. In guiding future research, scholars play a key role in creating frameworks that ensure the responsible and fair use of AI-generated prompts in education. This not only underscores Tlili's insights but also emphasizes the need for further research into the ethical implications of AI-generated prompts in education.

5 Conclusion

The present study highlights the importance of enhancing communication skills between higher education stakeholders and AI models, specifically ChatGPT, by devising effective prompts to achieve optimal results. The paper identifies three key areas where university instructors use ChatGPT, namely, planning, implementing, and assessing. To facilitate effective

communication with ChatGPT, the study proposes a two-layered formula comprising components and elements that can help users create customized and effective prompts. It is imperative that instructors have control over the responses to ensure that ChatGPT generates relevant and reliable responses, specifically designed for the given field. In this regard, the study recommends strategies such as chain prompting and summary elicitation to facilitate communication with ChatGPT. The study predicts that OpenAI will develop a specialized version of ChatGPT for academic settings, which will include customized functions for research, material development, teaching methodology, and assessment. As a result, educators should be prepared to adapt to this new technology and make the most of its benefits. The proposed formula and recommendations outlined in this study can serve as a starting point for developing ethical frameworks for the use of AI in higher education.

While this study significantly contributes to understanding ChatGPT's role in higher education prompt development, there are several limitations that warrant attention. Firstly, the focus of this study is limited to higher education, thus overlooking potential insights that could be gained from exploring AI applications across various educational levels. Secondly, the study primarily examines ChatGPT's effectiveness in traditional classroom settings, overlooking its potential applications and challenges in online classes or distance learning environments. Finally, the study does not thoroughly investigate the complexity related to AI applications in education, which includes considerations for diverse cultural backgrounds and learning styles. Future research should expand beyond higher education to encompass other educational levels and environments, such as online classes or distance learning settings, to gain a comprehensive understanding of AI's potential and limitations in education. This research should also aim to address the convolution associated with AI applications by exploring strategies to mitigate biases and improve AI's responsiveness to diverse cultural contexts and learning needs.

Acknowledgements We would like to express our deepest gratitude to Dr. Hamed Taherdoost, Dianne Cook, and Jeff McCarville for their exceptional assistance in proofreading and reviewing this paper. Their contributions have greatly enhanced the quality and clarity of the manuscript. We are deeply grateful for their support and guidance throughout the writing process.

Author contributions M.N. and G.S. jointly contributed to all facets of this study. M.N. led the conceptualization and planning stages, with a particular focus on outlining the manuscript. G.S. actively participated in the initial outline development and played a pivotal role in organizing key themes during the literature review. Both authors independently drafted distinct sections of the manuscript, followed by a comprehensive joint review and subsequent revisions, including meticulous proofreading. Furthermore, in the academic and research-related activities, M.N. engaged in formulating the AI model for higher education, demonstrating expertise in the technical aspects. G.S. took a leading role in crafting the discussion and conclusion sections, showcasing a strong analytical and synthesizing capacity. This collaborative endeavor not only signifies equal partnership in the research process but also reflects the diverse skills and expertise brought forth by both authors in their respective academic roles.

Data availability The findings presented in this study are substantiated by data sourced from ChatGPT, an AI model developed by OpenAI. However, owing to licensing constraints, the data utilized in this study are not publicly accessible. Nevertheless, individuals with an interest in accessing the data can do so by making a reasonable request to the authors. Such access, however, is contingent upon approval from ChatGPT OpenAI.

Declarations

Competing interests The authors declare no competing interests.

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Appendix A

The response generated by ChatGPT for the planning stage prompt

A screenshot of a ChatGPT interface showing a response to a prompt. The response is displayed in a dark grey chat bubble. At the top left of the bubble is the OpenAI logo. To the right of the logo are three icons: a copy icon, a thumbs up icon, and a thumbs down icon. The text of the response is as follows:

Sure, I'd be happy to help! Here is my suggestion for an interactive learning activity for Weeks 1 and 2 of your "Business Communications" course.

Week 1: "Issues and Trends in Professional Communication"

Activity: Group Discussion and Analysis of News Articles

Description: In this activity, students will engage in group discussions and analyze current news articles related to issues and trends in professional communication. This activity will provide an opportunity for students to explore the different perspectives and opinions surrounding various communication issues and trends.

Procedures:

1. Divide the students into small groups of 4-5.
2. Assign each group a different news article related to professional communication issues and trends.
3. Allow 15-20 minutes for groups to read and discuss the article, considering the following questions:
 - What are the key issues and trends highlighted in the article?
 - How do these issues and trends impact professional communication practices?
 - What are the potential implications for businesses and organizations?
4. After the group discussion, each group will present a summary of their analysis to the class.

Example: The instructor can provide news articles from reputable sources, such as The Wall Street Journal or Forbes, that highlight issues and trends in professional communication.

Tips:

- Encourage students to actively listen and engage in respectful discussion and debate.
- Emphasize the importance of critical thinking and analysis.
- Provide guidance and feedback on group presentations to help students improve their communication skills.

Week 2: "Memorandums, E-mail, and Routine Messages"

Activity: Writing Workshop and Peer Review

Description: In this activity, students will engage in a writing workshop and peer review to improve their skills in writing memorandums, emails, and routine messages. This activity will provide an opportunity for students to receive feedback on their writing and to learn from their peers.

Procedures:

1. Provide a brief lecture or presentation on the key elements of effective memorandums, emails, and routine messages.
2. Assign students to write a memo, email, or routine message based on a hypothetical scenario.
3. Allow 20-25 minutes for students to write their message.
4. Divide the students into small groups of 3-4.
5. Each student will share their message with their group, and the group will provide feedback using a provided rubric.
6. After the peer review, students will have 5-10 minutes to revise their messages based on the feedback received.

Example: The instructor can provide a hypothetical scenario, such as a communication breakdown between two departments in a company, and ask students to write a memo or email to address the issue.

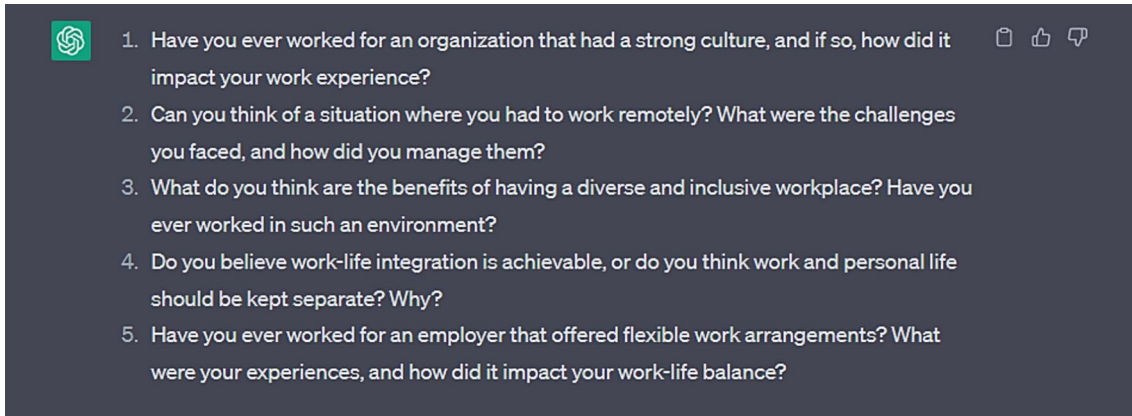
Tips:

- Provide a clear rubric or grading criteria to guide peer review feedback.
- Encourage students to provide constructive feedback and suggestions for improvement.
- Provide individual feedback to students on their revised messages to reinforce learning and improvement.

I hope this suggestion helps improve your "Business Communications" course!

Appendix B

The response generated by ChatGPT for the implementing stage prompt



A screenshot of a ChatGPT chat window. On the left is the OpenAI logo. To its right is a list of five numbered prompts. In the top right corner of the chat area are three icons: a document, a thumbs up, and a thumbs down.

1. Have you ever worked for an organization that had a strong culture, and if so, how did it impact your work experience?
2. Can you think of a situation where you had to work remotely? What were the challenges you faced, and how did you manage them?
3. What do you think are the benefits of having a diverse and inclusive workplace? Have you ever worked in such an environment?
4. Do you believe work-life integration is achievable, or do you think work and personal life should be kept separate? Why?
5. Have you ever worked for an employer that offered flexible work arrangements? What were your experiences, and how did it impact your work-life balance?

Appendix C

The response generated by ChatGPT for the assessment stage prompt



Context of and Purpose for Writing:



The student demonstrated a clear focus on the assigned tasks, audience, and purpose. The introduction provides the reader with background information, defines key terms, and presents a clear thesis statement. The essay's purpose is to examine the advantages and disadvantages of integrating social media in higher education.

Mark: 90/100

Suggestions: The student could improve the clarity of the introduction by providing a more specific definition of social media and its integration into higher education. One useful source for defining social media is the article "What Is Social Media?" from Lifewire (<https://www.lifewire.com/what-is-social-media-explaining-the-big-trend-3486616>).

Content Development:

The student has used appropriate, relevant, and compelling content to explore ideas within the context of the discipline. The essay provides a thorough analysis and synthesis of literature that supports the thesis.

Mark: 95/100

Suggestions: The student could improve content development by providing more concrete examples of how social media has been integrated into higher education, and by exploring the challenges and limitations of integrating social media.

Control of Syntax:

The student used correct word choice, spelling, and punctuation. However, the student could use more diverse vocabulary and sentence structures to enhance the style and tone of the essay.

Mark: 80/100

Suggestions: The student could improve control of syntax by using more diverse sentence structures, such as complex sentences, and by using synonyms and varied expressions to avoid repetition. One useful source for finding synonyms is the website Thesaurus (<https://www.thesaurus.com/>).

Control of Mechanics:

The student demonstrated consistent use of various connectors and pronouns to link ideas throughout the writing and shape the flow with clarity. Each paragraph has a well-developed central idea with logical groupings of articles.

Mark: 95/100

Suggestions: The student could improve control of mechanics by providing more transitional words and phrases to link ideas between paragraphs. One useful source for finding transitional words is the article "Transitional Words and Phrases" from Smart Words (<https://smart-words.org/linking-words/transition-words.html>).

Source and Evidence:

The student demonstrated consistent use of credible, relevant sources to support ideas that are suited within the discipline and genre of the writing. Each source is cited correctly in APA format.

Mark: 95/100

Suggestions: The student could improve source and evidence by using a wider range of sources and incorporating primary sources, such as interviews or surveys, to support arguments.

Formatting (APA 7th edition):

The student applied APA formatting throughout the written work consistently and accurately including body paragraphs, headings, and in-text citations.

Mark: 100/100

Suggestions: N/A

Final Remarks:

Overall, the essay demonstrates a good understanding of the advantages and disadvantages of integrating social media into higher education. The essay's structure and organization are coherent and clear, and the essay provides compelling evidence to support arguments. The student could improve the essay by providing more concrete examples of how social media has been integrated into higher education and by using a wider range of sources. The student should also consider using more diverse sentence structures and vocabulary to enhance the style and tone of the essay.

Total Mark: 91/100

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