



# Exploring the Path of Compiling TBCL Chinese Digital Teaching Materials with Generative AI—Taking ChatGPT for Example

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## Abstract

*This study aims to integrate the Generative Artificial Intelligence (GenAI) platform—ChatGPT with the Taiwan Benchmarks for the Chinese Language (TBCL)[14] for digital teaching materials (DTM) composition, proposing a digital teaching material composition model, showcasing the role of GenAI plays in DTM features. At the same, it shows the necessary measures to reduce the effect caused by the hallucination phenomenon[5] on the materials. The research production will be presented by web-based DTM which demonstrates the potential of GenAI in enhancing Chinese DTM composition. By adopting the IDEE framework[9] as foundational principles for designing web-based DTM with ChatGPT and using prompt engineering[11] as the research method, the study explores the strategies for avoiding the effect caused by the hallucination phenomenon in DTM composition with GenAI. It also delves into the potential features that GenAI can play in a web-based DTM. The procedure is as follows: (1) The instructional design is designed based on the Reference Guidelines for TBCL Application(RGTA) [15] and transcript as a unit outline. (2) input the unit outline into ChatGPT through prompt engineering, and generate DTM content based on the unit outline. (3) Using the Teaching Materials Editing Assistance System(TMEAS), the text is examined to ensure the content aligns with the TBCL proficiency level. Beyond assisting in material composition, GenAI can enhance features in web-based DTM as well : (1) utilize the “chat” from ChatGPT for “situational dialogue” and “essay review” by using prompt engineering, and (2) integrating “chat” by using webpage builder’s Hyper Text Markup Language (HTML), allowing learners to use “continue this chat” feature to replicates the “chat” to their accounts for self-practice. The study presents a web-based DTM, combining the GenAI platform with the RGTA and TMEAS for material composition and interactive features for web-based DTM. We hope to draw attention to the effect caused by GenAI in Chinese language education. The study provides preliminary insights, looking forward to offering a reference direction for the future development of GenAI-assisted Chinese language teaching and web-based DTM composition.*

**Keywords:** *Generative Artificial Intelligence, Taiwan Benchmarks for the Chinese Language (TBCL), Web-Based Digital Teaching Material, ChatGPT*

## 1. Introduction

In the current era of globalization, the significance of Chinese language teaching materials has ascended, more so with the advent of E-learning spurred by recent pandemic challenges. The Taiwan Benchmarks for the Chinese Language (TBCL), introduced by the National Academy of Educational Research(NAER), serves as an instrumental benchmark for Chinese language competency. However, a conspicuous absence of digital teaching materials(DTM) framed within the TBCL remains. OpenAI’s 2022 offering, ChatGPT, a GenAI platform based on a large language model (LLM), shows potential in this domain, presenting both opportunities and challenges. Notably, its capacity for real-time text generation and role as a virtual interlocutor holds promise for the Chinese DTM sphere. Yet, limitations arise, as evidenced by the platform’s occasional inability to retrieve specific content, such as details on TBCL and RGTA, from its database or generate unfaithful content called the hallucination phenomenon. This scenario underscores the criticality of vetting and curating AI-generated content(AIGC) for educational usage. The study will focus on presenting an actual example of applying GenAI to DTM composition by applying the IDEE framework and prompt engineering. Looking forward to exploring the path of making good use of GenAI for compiling DTM content and establishing features.

## 2. Literature Review

### 2.1. GPT Model and AIGC:



ChatGPT, built on the GPT model, is a pivotal player in the GenAI arena, deriving from the advanced natural language processing (NLP) domain. NLP, encompassing natural language understanding (NLU) and natural language generation (NLG), relies on the GPT model's Transformer architecture[10] for precise and stable generation of words. Consequently, ChatGPT skillfully responds to user prompts, showcasing its aptitude for educational uses. However, the hallucination phenomenon, where models produce misleading or nonsensical content[5], poses challenges in GenAI applications, especially in education. Language education is specifically required with DTM content fitting the targeted learner's proficiency level. Therefore, the content of the DTM will be generated based on prompts with the learner's proficiency level descriptors from RGTA to encompass the GPT model for AIGC and double-checked by using the TMEAS to avoid the effect on AIGC caused by the "hallucination".

## 2.2. Applying GenAI for Education:

The application of GenAI in educational sectors has seen increasing attention, underscored by frameworks such as Su & Yang's (2023) IDEE, which offers structured guidelines for ChatGPT's integration in education. While research, including works by Kasneci et al. and Baidoo-Anu et al., extols GenAI's merits in personalized tutoring, automated grading, and adaptive learning, challenges such as biases in training data and concerns about data privacy persist. Based on the research, we can see the potential of GenAI applied as personal tutoring and risks lies in AIGC for language educational uses. The IDEE Framework provides a perspective of applying GenAI in educational scenarios.

## 2.3. Web-based Digital Teaching Materials

Teaching materials, tailored to a unit outline, can be classified as discrete, correlated, or integrated[12]. This study focuses on integrated materials, derived unit outline from RGTA, using ChatGPT for generating DTM content and forming "integrated" DTM content. The research applied AIGC as DTM content and chatbot functions to DTM features. By using the Gamma. app, leveraging its HTML capabilities to structure content and embed media, aiming to create a web-based DTM that integrates AIGC digitalized with other platforms, such as Quizlet and Ricciwawa[16] and ChatGPT's "continue this chat" feature along with prompt engineering making it as a chatbot[2] assistant of "situational dialogue" and "essay review" features of the web-based DTM.

## 3. Research Question

- ( 1 ) How is AIGC applied in compiling a Chinese web-based DTM that follows TBCL?
- ( 2 ) What features can a GenAI platform offer in a self-made web-based DTM?

## 4. Research Method

### 4.1. IDEE Framework for Compiling Teaching Materials:

In this study, the IDEE framework guides the process of compiling AIGC DTM with GenAI features. This framework covers 4 dimensions: (1) **Identifying desired outcomes**, the input prompts for AIGC of the DTM will be based on the proficiency level descriptors in RGTA and so does the AI-powered features of DTM; (2) **Determining the level of automation**, the DTM composition will be semi-automated as for the AI-powered features will be fully automated; (3) **Ensuring ethical considerations**, emphasizing the need for educators to inspect AIGC for DTM by themselves or using tools, such as the TMEAS and verify dialogues between the GenAI and learners; and (4) **Evaluating effectiveness**, assessing if AIGC fits the TBCL proficiency level descriptors and the results of "situational dialogue" and "essay review" features, and effectiveness on real-time teaching scenarios requires quantitative data in future studies.

### 4.2. Prompt Engineering for Compiling Teaching Materials:

The concept of prompt engineering aims to automate software development tasks for generative AI. Based on the White et al (2023) study, it enhances prompt references ChatGPT, aiming to suggest prompts specifically for AIGC. Such strategies include providing the GenAI a name and classification, the intent or motivation of the task, the structure or an example demand of the AIGC, and giving adjustments based on the generated consequences[11]. They delve into GenAI's abilities to generate content for DTM along with TMEAS addressing the hallucination phenomenon. The research presents templates for text, vocabulary, drills, and classroom activities. The final objective is to establish a web-based DTM infused with AIGC and AI-powered DTM features.



## 5. Results

### 5.1. AIGC as Core Content of DTM – Text Content

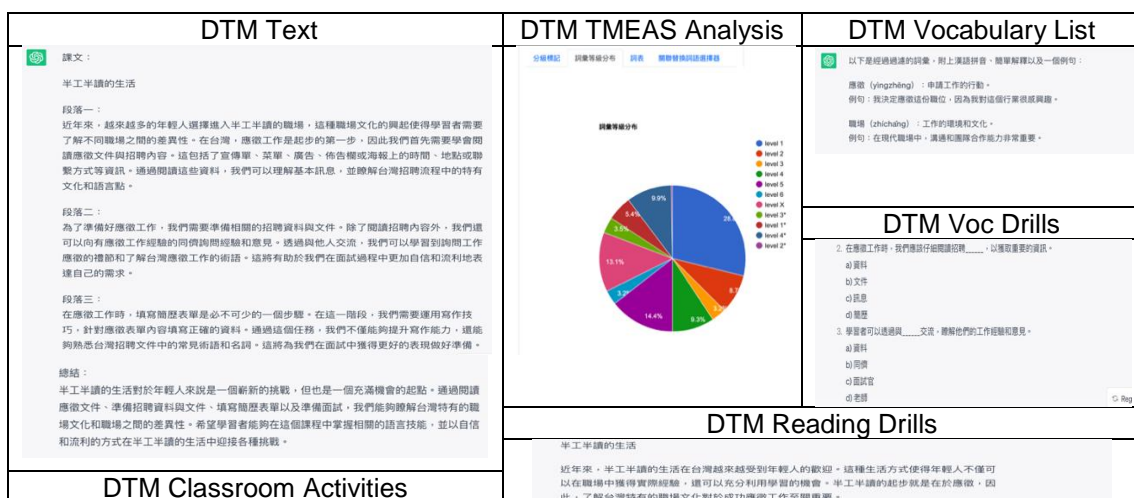
Firstly, based on RGTA, the unit outline was drafted as a prompt for the text content was formulated as follows: “你現在是一位在美國教學的華語老師，聽完我提供單元大綱、教學方案，請協助我編寫教材內容（插入單元大綱），課文的形式應為「課文」、難度應該落在華語中級，字數大約 500 字左右，分為 3 段”(You are now a Mandarin teacher teaching in the U.S. Having listened to the teaching unit outline and the teaching plan I provided, please follow my teaching outline **[insert unit outline content]** for the content. The text should comprise **[lesson content]**. The difficulty level should be **[intermediate]** in Chinese, and the word count should be around **[500 words]** divided into **[3 paragraphs]**). The generated content is shown in Fig. 01-DTM Text. Fig. 01-DTM TMEAS Analysis shows how the system works with the AIGC. By using TEMAS, the researcher can inspect if the AIGC fits the learner’s TBCL proficiency level and make adjustments to the AIGC for the DTM.

### 5.2. AIGC as Extended Content of DTM – Vocabulary, Drills, and Activities

After revising the core DTM text through human inspection and using TMEAS, the “詞表”(vocabulary list) feature of the system was utilized to produce the targeted vocabulary items. Through prompt engineering, non-target-level vocabulary items were filtered out. Further, a simple explanation and example sentences were extended for each vocabulary item. The prompt for the vocabulary list was formulated as follows: “貼上詞表，幫我去除上面的非目標級別的詞彙，並去除中間的詞頻。並且為剩下的詞彙加上漢語拼音與簡單的解釋，以及提供每一個詞彙一個例句”(Paste the original vocabulary list) This is a vocabulary list. Please help me remove the **[non-target teaching level]** and eliminate **[grade]** and **[word frequency]**. Also, add Pinyin, an explanation, and a sample sentence for each vocabulary item). The generated results are as Fig. 01-DTM Vocabulary List.

The prompt for the drills was formulated as follows: “請幫我根據上面的課文、詞彙，出 10 題，4 題詞彙題，4 題對話完成選擇題，一個延伸閱讀題組，且需要包含兩個子題(每個題目要有四個選項，閱讀題的題幹約 200 字)”(Based on the teaching materials provided above, please generate **[10 multiple-choice]** questions with **[4 options]** each, 4 **[vocabulary]** questions, 4 **[dialogue completion multiple-choice]** questions, and an **[extended reading]** question with **[2 sub-questions]** (the stem of the drills should be around **[200 words]**)).” Results are shown in Fig. 01-DTM Voc and Reading Drills.

The prompt for the classroom activities was formulated as follows: “請幫我根據上面的教案設計 3 項以真實情境為基礎的任務，並說明任務的實施細節與注意事項”(Based on the teaching plan mentioned above, please generate **[3 real-world situational tasks]**, and detail the execution specifics and considerations for each.) The generated results are as Fig. 01-DTM Classroom Activities.





<p>任務三：簡歷填寫與職場術語學習</p> <p>實施細節：</p> <ol style="list-style-type: none"> <li>1. 提供學生一份空白的簡歷表格。</li> <li>2. 學生根據自己的情況填寫簡歷，包括個人資料、學歷、工作經驗等。</li> <li>3. 學生使用所學的職場術語，使簡歷更專業。</li> </ol> <p>注意事項：</p> <ul style="list-style-type: none"> <li>• 強調簡歷的格式和內容，幫助學生理解如何突顯自己的優勢。</li> <li>• 提供一些常見的職場術語供學生參考。</li> </ul>	
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Fig. 01 : OpenAI ( 2023 ) AIGC as DTM content

### 5.3. GenAI as an Interactive Learning Tool for Web-Based Digital Teaching Materials: Situational Dialogues & Essay Review Features

ChatGPT can enable learners to achieve self-directed learning effects by interacting with it through a natural language based on the research mentioned before. I have crafted prompts for two DTM features: situational dialogues and essay review.” A prompt for situational dialogue was formulated as follows: “你現在是一位畢業生面試官，請你問我問題，並等我回答繼續問我，面試官的語言難度應適中，不要過於複雜，並在合適的情況下結束”(You are now an [interviewer for a graduate position]. Please ask me questions, wait for my response, and continue asking. The language used in the interview should be of moderate difficulty and not overly complex. Conclude when appropriate). The chat history of the feature is shown in Fig. 02-DTM Situational Dialogue.

The prompt for essay review was formulated as follows: “你現在需要根據學生輸入的文本內容給予修正建議、點出錯誤，我輸入想要被檢查的中文段落或句子。我的文本越詳細完整，你給的修正建議就越精。你要根據我的輸入，提供語法、用詞、標點符號等方面的修正建議。你要把錯誤和建議明確的標記和解釋”(Now, based on the text content input by the learner, you need to provide correction suggestions and point out the error. I will input Chinese paragraphs or sentences that I want to be checked. The more detailed and complete my text is, the more precise your correction suggestions will be. You should provide correction suggestions based on my input, addressing aspects like grammar, vocabulary, punctuation, etc. Errors and suggestions will be marked and explained). The generated result is as Fig. 02-DTM Essay Review.

<p> 你現在是一位畢業生面試官，請你問我問題，並等我回答繼續問我，面試的語言應難度適中，不要過於複雜，並在合適的情況下結束</p> <p> 當然，讓我們開始面試吧！首先，請告訴我一些關於你自己的背景和教育經歷。</p> <p> 我是來自台灣畢業於國立台灣師範大學華語文教學系的學生，吳達奇，我想應徵貴公司的華語教材編輯的職位。</p> <p> 很高興認識你，吳達奇先生。你的教育背景和專業相關，確實與我們公司的職位需求相符。請問你在大學期間是否參與過任何與華語教學或教材編輯相關的實習、專案或經驗？</p> <p> 我曾經在美國明德書校實習半年，曾經參與「現在中文課程」教材的共同編輯工作</p> <p> 很棒！這些經歷都讓你具備了一些實際的教學和教材編輯相關的經驗。在編輯教材的過程中，你遇到了哪些具有挑戰性的情況，以及你是如何克服這些挑戰的呢？</p> <p style="text-align: center;">( Part of the chat history is omitted )</p> <p> 我曾經為「現在中文課程」結合 ViewSonic 的 myViewBoard 製作完整的互動式教材，學生不論是線上或實體都能透過個人裝置和教師教材進行互動，如果教學的教室有電子白板，還能讓學生上台和教材進行互動，我相信這樣的實例證明有能力勝任貴公司的工作的</p> <p> 這個實例非常具體且令人印象深刻，你成功地結合了數位工具和互動元素，提升了教材的互動性和學習體驗。你的經驗顯示出你能夠創造具有價值的教學內容，並且運用科技工具來有效地支持學生的學習。</p> <p>吳達奇先生，感謝你的詳細回答。你在教材編輯和教學方面的經驗和想法非常令人欣賞。在你的回答中，你展現出了適應能力、創造力和對教育的熱情。我們會將你的面試表現納入考慮範圍，稍後我們將通知你有關進一步步驟的訊息。再次感謝你參與我們的面試！</p>	<p> 你現在需要根據學生輸入的文本內容給予修正建議、點出錯誤 我輸入想要被檢查的中文段落或句子。 我的文本越詳細和完整，你給的修正建議就越精確。 你要根據我的輸入，提供語法、用詞、標點符號等方面的修正建議。 你要把錯誤和建議將會明確地標記和解釋。</p> <p> 當然，我會盡力根據您提供的文本給予修正建議和指出錯誤。請您提供您想要檢查的中文段落或句子，我會在之後的回答中給予您相應的修正和建議。</p> <p> 大家好！我是「小啄木鳥」——陸詩綺。今天請和我一起上大街上找找錯別字吧！ 從學校出來，看到門前小賣部有一塊牌子上面寫著「往南500米停車場」。「停車場」是什麼意思呀？走去一看，原來是停車場，好一個「停」打不分呀！ 走了沒多久，我看到百貨大樓旁的一家店正在搞國慶慶典。門口廣告牌上寫著「燈峰造極」。明明應該是「燈峰造極」呀！我想這肯定是店家想讓人過目不忘而想出的高招。但這一廣而告之的「燈峰造極」會給許多小朋友一種誤導，他們真的會認為「燈峰造極」就是「燈峰造極」吧！一路上，我不時地看到一些如「騎樂無窮」、「快不容緩之類」的廣告牌，我覺得這真有些污染市容市貌。作為世界旅遊名城和歷史文化名城的桂林，乾淨的大街上真會冒出那麼多的錯別字，這會讓那些中外遊客怎麼想？他們肯定認為桂林這座山水的確實好，可人文化水平卻不高。</p> <p>我還在電視裡看到一則關於花露水廣告——「默默無蚊」。的確，人們一看產品名就會覺得廠家別出心裁，認為這產品質量肯定很不錯。可是，當我們小學生看到後，在文章中也寫到「要做一個默默無蚊的人」時，那結果就不僅僅是令人一笑了之那麼簡單的事了。我還在某一本書中發現，上面把「變」字印成了「變」字，我頓時驚愕了，原來這本也有出錯的時候！當然，我在寫作文時也經常有錯字，如把「賢」字寫成「賢」字。我還喜歡把「甚」字寫成「甚」，鬧出不少笑話。</p> <p> 您的文本看起來已經非常清晰，但我還是幫您指出一些可能的修正建議和錯誤：</p> <ol style="list-style-type: none"> <li>1. 將「停車場」改為「停車場」，語法和用詞錯誤。</li> <li>2. 將「燈峰造極」改為「燈峰造極」，這是正確的用詞。</li> <li>3. 「騎樂無窮」、「快不容緩」之類廣告牌，應該是「騎樂無窮」、「快不容緩」。</li> <li>4. 「桂林這座虛名」應改為「桂林會失去美譽」，這樣表達更準確。</li> <li>5. 「要做一個默默無蚊的人」，將單引號中的「蚊」改為「聞」，以修正用詞錯誤。</li> <li>6. 書本中的「變」字印成了「變」字，這是印刷錯誤。</li> <li>7. 「我還喜歡把「甚」字寫成「甚」，將「甚」改為「甚」，這是正確的用詞。</li> </ol> <p>以下是修正後的文本：</p> <p>大家好！我是「小啄木鳥」——陸詩綺。今天，請和我一起上大街上找找錯別字吧！ 從學校出來，看到門前小賣部有一塊牌子，上面寫著「往南500米停車場」。走去一看，原來是停車場，好一個「停」打不分呀！</p>
<b>Situational Dialogue</b>	<b>Essay Review</b>

Fig. 2 : OpenAI ( 2023 ) the demo of the two DTM features



By using the HTML embedding technology in the Gamma. app, the digitalized AIGC with Edtech features and AI-powered features, such as situational dialogue, and essay review can be presented as a web-based DTM. (The prototypical web-based DTM link will be provided in the reference[15].)

## 6. Conclusion and Discussion

This study explored how GenAI integrates with the TBCL for developing Chinese web-based DTMs. The research found that prompt engineering based on the unit outline of RTGA and a cross-referencing inspection platform(TMEAS) is required to overcome the potential hallucination issue since ChatGPT can't inherently recognize RTGA proficiency descriptors. The web-based DTM of the research shows the effectiveness of integrating GenAI in compiling DTM. While ChatGPT proves its value in generating teaching resources and aiding learners, platforms like LingoTeach.ai[17] highlight a more precise use of GenAI in compiling DTM content, CoolE Bot[18] demonstrates applying chatbot to situational dialogue, and Linggle Write[19] presents how GenAI assists essay review. In conclusion, while GenAI's role in compiling DTMs or even language education is growing, the focus should be on enhancing the learning experience, with GenAI platforms potentially allowing educators to concentrate on tailored teaching and improving overall Chinese language education quality.

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