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Creativity in generating lesson plans: Teachers versus chat GPT

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Abstract:

Large Language Models (LLMs) have recently emerged as valuable assets in EFL teacher's toolkits. These AI powered models, however, pose serious questions regarding the traditional roles of teachers. In the present study, we explore whether the AI model chat GPT (version 3.5) will outperform teachers in generating creative teaching ideas. To test this possibility, a group of EFL Algerian teachers are asked to brainstorm ideas on how to creatively approach various lessons pertaining to the program of English in secondary school, with Chat GPT (3.5) prompted similarly. Without knowledge of their source, a neutral third group composed of 33 secondary school teachers are then asked to assess the generated lesson plans. A paired samples T-test design is employed to decide the degree of statistical significance. In all but one lesson, chat GPT proved no better than practicing teachers in the task, with the latter showing a slight overall advantage. This study contributes to understanding the role of AI and how it might disrupt traditional teacher's roles, particularly as planners. Ultimately, the present study contributes to the ongoing discourse of integrating AI in language education.

Keywords: Artificial Intelligence (AI), English as a foreign language (EFL), chat GPT, Large Language Models (LLMs).

1.Introduction:

Upon its initial release in late November 2022, Chat GPT took the whole world by storm. It swiftly became the fastest growing consumer application in history, reaching an estimated 123 million active users only three months after its release (UBS ,2023). The interactive conversation-like nature Chat GPT offers, attention to linguistic context, the vast pool of knowledge, ease of use and more recently, the capacity to preserve a memory of user's past interactions have all been revolutionary. So revolutionary in fact that chat GPT and other Large Language Models (LLMs) have violently disrupted entire industries. For instance, according to shortlist platform (2024), up to 52% of businesses are now using Chat bots for tasks like responding to customers queries. Gartner (2023), in turn, predicted that by the year 2025, up to 80% of customer services will be handled by Generative AI, including chat bots like Chat GPT. This ranges from trouble-shooting services to providing technical advice to appointment scheduling and payment assistance. The once- popular platforms like Quota and GitHub have seen their internet traffic and revenues drastically reduced upon the introduction of generative chat bots , though they recently tried to counteract by introducing their own AI bots (Flyaps,2023 ; Impact Lab,2022) .Chat GPT can , among other things , create art and music ,write essays , summarize texts , translate from and into many languages , create content , solve math equations , write computer

code and , for teachers , generate lesson plans , create tests and quizzes as well as grade and evaluate students' work.

Chat GPT is an example of the larger class of Large Language Models (LLMs). The basic structure of Gemini, Chat GPT, Copilot and numerous other chat bots is identical; all have been fed massive amounts of human knowledge, learned statistical patterns and then, using mathematical cost functions, they were trained to respond to user's queries. According to Florida and Chiraitti (2020), LLMs are AI powered tools, i.e. they use an underlying neural network structure that have been trained on a vast amount of human text and then given the task of generating human-like responses. From a wide historical perspective, LLMs are no small marginal feat. It's rather a major technological breakthrough, easily classified alongside other life-changing technologies as TV sets, the internet, laptops and washing machines. Their versatility and wide ranging applications criss cross many domains. For the first time, a fallible human being hungry for information is meaningfully conversing and interacting (not merely reading passively) with an entity that practically stores, and can make use of, most of human knowledge up to that point.

2.LLMs Impact on teachers Job

GPTs are, after all, models of language. While these models can, based on their transformer architecture, generate pretty much everything that can be fragmented into tokens (Vaswani et al 2017), using them to generate natural language remains the most popular (Floridi & Chiriatti, 2020). The present study targets English language teachers and, of all languages, recall that English had been the language on which Chat GPT was the most extensively trained. As a consequence, the performance of the model is in many ways more effecient in English compared to other languages (O'Flaherty, 2024).

This can act both as an advantage and a disadvantage for teachers of English. On the one hand, If an EFL student has access to a chat bot that can interact with them, provide immediate feedback, respond and account for to their needs and even simulate realistic conversations, that will surely reduce the need for teachers as educators of English and thus end up putting the two at odds. Compared to other languages where the chat bot still underperforms, as is the case with Arabic, teachers of Arabic are consequently still in greater demand.

On the other hand, teachers of EFL can stand as major beneficiaries given the fact that Chat GPT is primarily designed to work in English language; 93% of its training data is in English and the remaining 7 % sandwiched between other languages (Style Factory, 2024). Therefore, of all languages, Chat GPT can evaluate and write better English essays, better capture English cultural nuances and better analyze English texts, among other things.

This invites the following question. Which direction is the relationship, or perhaps race, between flesh-and-blood teachers on the one hand and language models is heading. In their paper for the world economic forum, Sadia and O'reilly (2023) classified a set of jobs and their relationship to large language models such as Chat GPT. They concluded that LLMs can influence future jobs in the following ways:

1.High potential for automation: this is where LLMs are very likely to cancel the need for humans entirely.

2.High potential for augmentation: Those are Jobs where Language models can be employed alongside humans, increasing their productivity and efficiency.

3.Low potential for automation or augmentation: LLMs continue to influence these category of jobs, albeit mildly. The risk of takeover is low.

4.Unaffected: humans continue to perform these jobs without any interference from LLMs.

The paper does not mention teachers of English specifically, but without a doubt, teachers of English stand to gain enormously from LLMs. Due to the, interpersonal collaborative nature of the job, it's highly unlikely that LLMs might ever take the job of teachers in EFL or otherwise, although GPTs are showing remarkable skills in reading and interpreting people's emotions (Harari,2024). Jobs that require interpersonal communication are the least affected by automation. However, saying that teachers of English are completely unaffected is far-fetched still. LLMs have the potential to augment teachers job in varying degrees, depending on teachers' degree of embracement of the models and their clever use of them. The role of teachers in the use of LLMs in various EFL tasks embodies what can be called "a humans in the loop" (cardona et al, 2023). In this view, teachers may still make a large part in decision making, reshaping and enhancing the chat bots' suggestions and building on them.

3.Using LLMs in EFL settings

LLMs have been around for a while now, and their potential to augment teacher's job ranges from promising, to say the least, to outright revolutionary. One of the major advantages of Chat GPT is its ability to cater for different student's needs, for different contexts and scenarios and then even build a progression on those situations. This could happen by direct prompts to the language model; eg. generate a project idea on environmental protection for a group of high school students, or by relying on the models ability to preserve a memory of past interactions and tailor its responses accordingly. This is one area where other forms of technology assistance can fail teachers, namely, their failure to provide tailored responses. Chat GPT effectively fills out the gap that traditional forms of classrooms assistance often struggled with (Amin,2023). Furthermore, Stojanov (2023) argued that due to their flexibility, LLMs can easily fill out the gap that mentors and educators do in a ZPD (zone of proximal development) model. LLMs can act as a scaffolding agent capable of pushing students to their local optimal performance. Their ability to construct dynamic artificial dialogues and provide explanatory feedback (of Grammar points for example) have been highlighted as major benefits (Darvishi et al., 2024). Not only that, LLMs can tap on individual learner's motivation and engage them into the learning experience because it puts the learner in a more active rather than passive situation (Lin and Chang, 2023). ChatGPT, in particular, has shown promising results in generating high-quality text and engaging in meaningful conversations (Radford et al., 2019)

In a very similar vein, Chen et al (2023), in a meta-analysis that involved many reviews, noted a large margin of improvement for students who utilized AI driven intervention compared to those without. This stems principally from the personalized experience and adaptability that AI tools offer, including Chat GPT and similar LLMs. Further, LLM offer more than just text interaction. Voice chats offer opportunities that mirror real-world

language use experience (Amin, 2023). They can be tailored to fit one's own level of English, interests and preferences.

The study by Kohnke (2023) highlights that Chat GPT supports language learning by simulating real-life interactions, clarifying word meanings in context, correcting and explaining linguistic errors, generating texts across various genres, developing assessments, annotating texts, and offering dictionary definitions, example sentences, and translations. Moreover, Chat GPT can assist language teachers by facilitating the creation of reading passages and language test questions more efficiently. Additionally, educators can utilize this technological application to provide personalized learning experiences, design and modify teaching materials, and develop programs for scientific research. The chat bot responds rapidly to the teacher's needs. For example, in the researcher's own experience when once educating students about the morphological structure of words in the context of ethics in business, it may be both time-consuming and daunting to try to find, say, ten or twenty words that all end with the suffix "ment" in that context. Those are also not available with a simple search of the internet. Thanks to Chat GPT, one could just prompt it and it can generate the 20 words on the spot, sparing the teacher so much time and effort.

4.Creativity of LLMs in generating lesson plans

As already mentioned, both chat GPT and teachers were explicitly asked to be creative in generating the lesson plans examined in this study. In this regard, a lot of debate has been sparked over whether LLMs are by themselves creative. Basically, LLMs have been fed massive amounts of human-made texts and based on both the statistical patterns they have learned from the occurrences of words (i.e. tokens) and the present context, they end up with a probability distribution over all possible tokens, on which they choose the next word in a sequence. But does this amount to creativity? This question is beyond the scope of the paper. What's relevant is that Chat GPT guesses the next word in a sequence based on statistical patterns, no real understanding of the orompt is involved and more crucially, no understanding of cause-effect relationships (Pearl & Mackenzie, 2018). If the teachers prompt includes the expression "environmental protection", and in its training data, this expression co-occurs with "recycling" and "sustainability" so often, LLMs will likely select those words together in its answer.

Arguably, the most important question teachers ask before each lesson they are tasked with teaching is "how can I approach this lesson and present it to students in the most interesting and most effective way?". This is important not only because the answer to this question determines the whole structure and tone of the lesson later, but also because even if alterations on the lesson happen, it's usually based on that specific track that the teacher has set for themselves prior to entering the class. In other words, the first teaching idea sets a hard-to-overturn path-dependent track.

Bonner et al (2023) have shown examples of how LLMs, Chat GPT in their case, can be used to generate activities for varying levels of student competencies. These ideas often incorporate multi-modal tools. Pictures can be generated and the conversation can be followed to calibrate the plan and build on it.

5.Methodology and participants

To reiterate, this is a study that compares the ideas generated by a group of practicing high school teachers to those suggested by Chat GPT (version 3.5). A total of 13 secondary school teachers pooled from different regions in Algeria have been recruited in the study. Each was asked to brainstorm a teaching idea for a lessons chosen randomly from the syllabi of first, second and third year programs in the secondary school stage. Both teachers and chat GPT were explicitly asked to be creative in their responses. The lessons concerned encompassed the whole range of competencies and language skills targeted in the curriculum. These include grammar, reading, writing, speaking, listening, phonetics and pronunciation, introductions to learning units, vocabulary building lessons as well as extra-curricular projects.

To eliminate the ambiguity around the term, a "teaching idea" is the conceptual approach to lesson design that precedes the more detailed lesson plans. It serves as an initial intuition for approaching lessons rather than prescriptive instructions (Buckley & Higgins, 2017). In this way, teaching ideas are those initial intuitions that answer the question, how am I going to approach this or that lesson? Having that settled, teachers will then proceed to structure their lesson and lay down their more detailed procedural plan based on such first-step intuition.

The second stage in the study involved a neutral third group of secondary school teachers who are asked to rate each idea - without knowledge of its source - on a 5 points lickert scale, from extremely willing to try the idea, to extremely unwilling.

This arrangement amounts to an experimental design, with the population being secondary school teachers in Algeria at large. Our task as researchers is to test if the ideas generated by the chat bot differ statistically from those generated by teachers. A group of 33 practicing high school teachers were drawn, by means of convenience, from different regions in Algeria and asked to rate the teaching ideas via an online survey. Raters reported an average job experience of 7 years (± 6 years).

The following graph visualizes the general setup of the study.

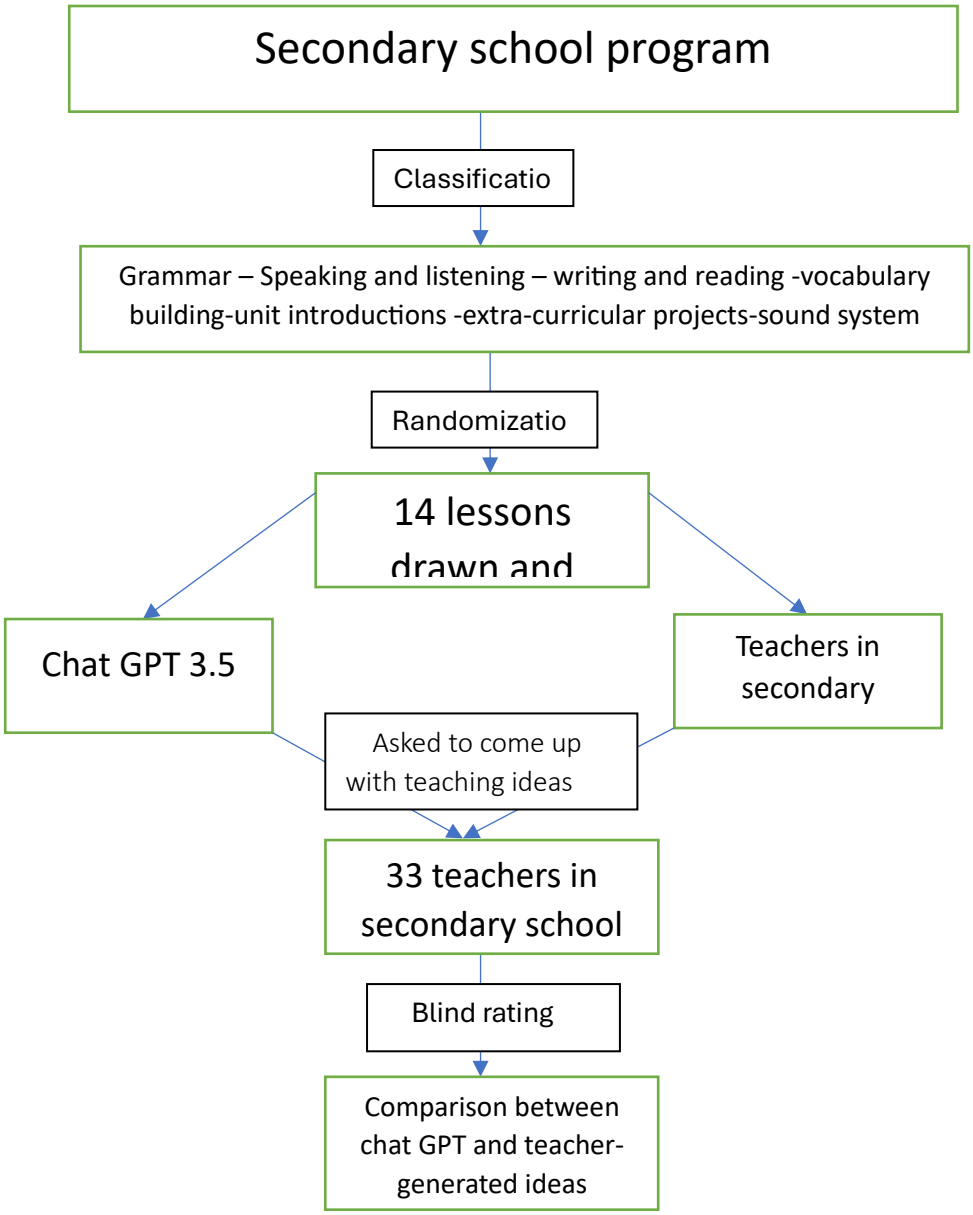

Figure 01: The setup employed in the study.

Upon prompting the generative chat bot (chat GPT 3.5), the following information have been supplied.

- The fact that these are EFL students, i.e. non-native learners.
- Contextual information (what's the theme under which the language items are presented)
- Information about the lesson itself.
- Pedagogic objective of the lesson
- class size

Example:

The following is an example from the present study showing two teaching ideas put against one another. The lesson concerned here is a learning unit by the name "budding scientist

"taught for second year students in secondary school. The unit, as the name suggests, introduces students to scientific experiments and how to describe and report on them using various linguistic devices such as the conditional if type zero. The task is to come up with an idea for introducing this learning unit to students and prepare them for the upcoming "scientific" content.

The creative idea generated by a practicing teacher:

"The teacher starts by providing students with a list of names of inventors and they match them with their inventions. Then T divides students into groups, assign each group an invention and have them fill in a table that contains the following columns: "Why do we need the invention", "date of invention ", "what people used to do before it ", "how do you think it will evolve in the future". etc. The teacher monitors their responses and corrects them, then each group draws their corresponding table on their copybook"

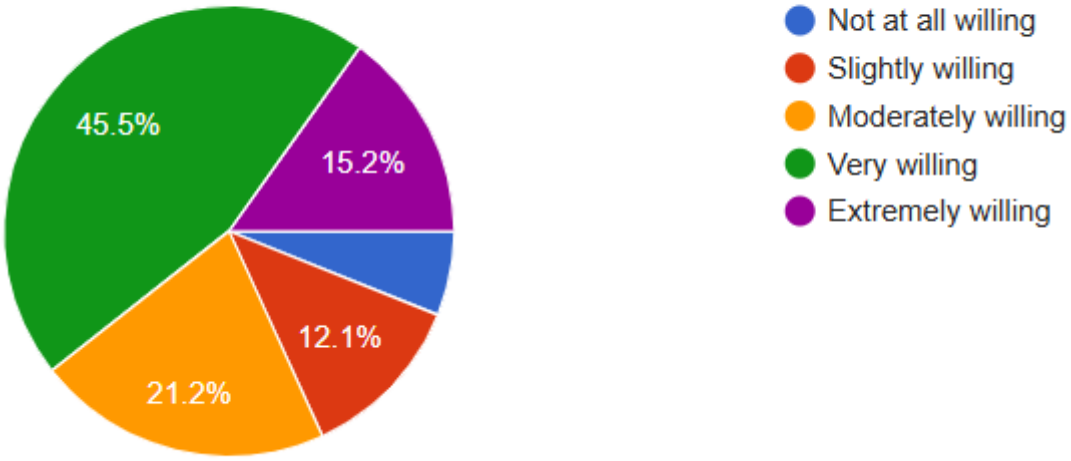

Figure 2: Teacher's willingness to try out the idea generated by one of their peers.

A teaching idea generated by chat GPT over the same topic:

"The teachers start by explaining the importance of innovations by giving one example of a famous inventor whose invention has changed the world. The teacher then divides the class into groups and gives each a set of sticky notes. The teacher then provides a long list of inventions and asks students to write down as many facts about those inventions as possible. The goal is to write as many facts as possible in the shortest possible time. Students can then stick on the board the most interesting of those facts and explain them to their mates. Then, as a class, the discusses the commonalities between all of the inventions, their purpose, and which impact each had on society"

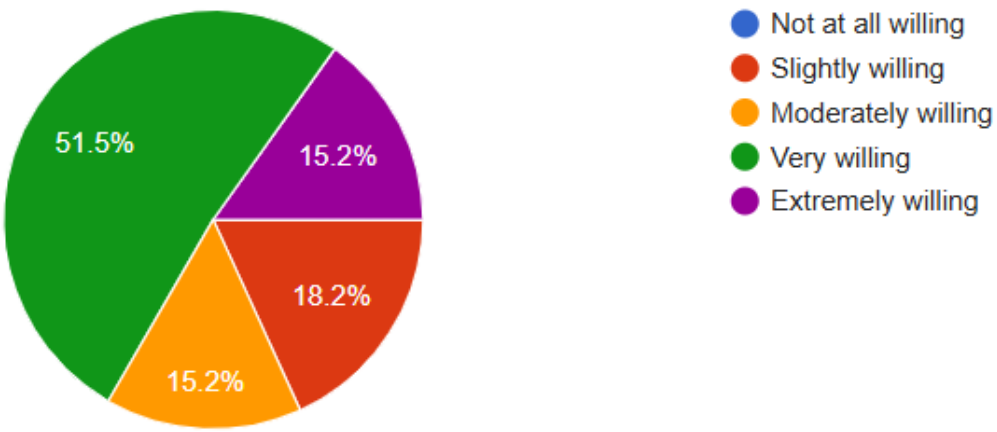

Figure 3: teacher's willingness to try out the same idea generated by chat GPT (3.5).

The following two hypotheses are layed down:

Ho: There is no statistically significant difference between chat GPT-generated ideas and those suggested by practicing teachers.

H1: There is a statistically significant difference between teacher-generated teaching ideas and those offered by chat GPT (3.5)

Over each and every lesson a standard T-test, with a significance level of 0.05, is run to identify whether the rating gap is statistically significant.

6.Results:

The following table summarizes the results. The mean difference and other metrics in this table have been obtained after subtracting teacher's scores from Chat GPT scores.

Lesson concerned	Level	Category	Mean difference	Standard deviation	T-test (sig=0.05)
Introducing the unit "Budding Scientist" , a learning unit that deals with the theme of science and experiments.	Second year	Unit introductions	0.121	1.340	0.607
An extra-curricular project on a	First year	Extra-curricular projects	-0.121	1.386	0.619

learning unit on pollution , called “Back to Nature”					
A written composition on the causes and effects of Global Warming	Second Year	Writing and Reading	-0.121	1.672	0.680
Expressing advice with “should”,”ought to “,“had better “ , in the context of Ethics in Business	Third year	Grammar	0.969	1.722	0.003*
Lexical items around the theme of journalism	First year	Vocabulary building	-0.242	1.392	0.325
Use of the suffixes “ive” and “al” , a unit on education and classrooms around the world	Third year	Vocabulary building	0.393	1.412	0.119
Describing people’s personality and physical traits, a learning unit on stories and tales	First year	Listening and speaking	-0.181	1.309	0.431
social media’s pros and cons	First year	Listening and speaking	-0.121	1.317	0.601
Homophones and Homonyms	Second year	Phonetics	-0.242	1.199	0.254
Pronunciation of the final “ed”	First year	phonetics	-0.333	1.594	0.239
Introducing a unit on Ancient Civilizations	Third year	Unit introductions	-0.030	1.357	0.899
Stress in compound words	Second year	Phonetics	-0.606	1.248	0.782
An essay on the importance of	Third year	Writing and Reading	-0.393	1.434	0.125

Ethics in Business					
Expressing concession with “unlike “ , “by contrast “ , a learning unit comparing modern and past lifestyles	Second year	Grammar	0.121	1.192	0.563

Table 01: a summary of the results.

The table above summarizes the results of the common standard tests run on the data. All values shown in the table relate to the differences in ranking between teacher-generated lesson ideas and those by Chat GPT. Given that the sample is large enough n≥ 30, the Central Limit theorem is assumed to hold and the paired sample t-test is warranted (Kwak & Kim, 2017). The latter is chosen after having subtracted the rating scores of teacher’s ideas from those generated by Chat GPT (3.5).

6.1 Means

The mean differences varied across the lessons. Positive values indicate a preference for the lessons generate by Chat GPT while negative values suggest a general average preference for the lessons ideas thought of by teachers. In only 4 of the 14 lessons were teachers opting for Chat GPT suggestions. Teachers ideas have been generally preferred in the rest of the lessons. These four include an introduction to the unit of budding scientist, which was described above. Another lesson where Chat GPT have shown a considerable advantage (average difference=0.39) is one on forming adjectives that end with “al” and “ive” in the context of classrooms and education. In this respect, chat GPT suggested first brainstorming words related to education, writing them in flashcards and sticking them on the board, students then think of adjectives that fit each word and attach the appropriate suffix to them. By contrast, the teacher assigned that lesson suggested a video showcasing different classrooms around the world, the teacher asks students to jot down all words they know which end with “ive” and “al”. The teacher assigns a task were students divide words into their affixes and then employ those words in sentences of their own. a Slight advantage for chat GPT has also been recorded in a lesson on how to express concession using “unlike” and “by contrast “. Finally, the only lesson that surpassed the significance threshold is on how to express advice using the appropriate modal verb.

Teachers have generally done better than the Chabot, though none of their suggestions passed the significance threshold. The largest mean difference pertains to a lesson where students are asked to write an essay on the importance of ethics in business.

To wrap up, we record a slight advantage for teacher’s generated ideas. This could be due to the fact that teachers are well- familiar with those lessons and their proper contexts. Other teachers, therefore, leaned towards their answers.

6.2 The standard deviations

The standard deviations, which are a measure of variability, have ranged from 1.19 to 1.72. This shows that teachers ratings, on an inter-item view, exhibited moderate variability. In many lessons, teacher's ratings were consistent and they have shown a large degree of agreement in most items of the survey. On "expressing advice ", teacher's answers are the most dispersed, and it is also the one that went over the significance cutoff. In general, most SDs hover around 1.3 which suggests that teacher's ratings do not deviate so much from one another.

6.3. The T-test

The t test is a standard statistical test used to assess if the mean differences between two groups are significant or if they are no better than chance.

As can be noted, most t-values are small, and in all but one lesson, the p-values are above the cutoff point of 0.05. Therefore, we can conclude that there is no significant difference between the mean ratings of lesson plans compared to the hypothetical mean difference of zero. This absence of significance suggests that, overall, teachers didn't favor either chat GPT responses or those supplied by their peers. Still, three lessons are worth highlighting; One where the lesson was significantly in favor of chat GPT (expressing advice, Sig 2 tailed = 0.003) and another 2 lessons that approached significance in the opposite direction of favoring teacher-generated response. These are an "Essay on the importance of ethics", sig 2 tailed= 0.125, and using the suffixes "al" and "ive", sig 2-tailed=0.119.

One expressing advice using modals "had better", "should"", "ought to "in a context of ethics in business, chat GPT suggested the following.

"The teacher starts by showing students a case of corruption or fraud on a newspaper or a video. The teacher discusses how this case could have been prevented if certain measures were taken. Then, the teachers write a simple advice sentence and asks students to identify the advice modal used. Then, the teacher gives each student a worksheet with advice sentences and asks them to fill in the blanks with "should ""have to" and "ought to" and review the answers as a class. After that, students work in pairs or small groups where they write sentences of advice to prevent corruption and discuss them as a class. In the end, they develop these sentences into a whole paragraph."

Since we're taking the mean difference, the teacher's response is also worth mentioning.

"The teacher asks their students if they had ever extracted an official document. Some will certainly talk about the complications they had to face along the way. The teacher then asks what advice they would give when facing beaurocratic complications like this, thus way introducing modals of advice. As a practice and production at the same time, the teacher introduces a new situation related to the theme and requires the students to write a short paragraph using the grammar of advice"
Preference of chat GPT suggestion does not always mean that it is effective. It could also be the case that the teacher's response is ineffective in this case.

6.Limitations and discussions:

This is a study that aims at comparing the creative ability of Chat GPT and teachers to come up with ideas of teaching. But what does it mean for a Chat bot to be creative? As they are trained, they learn associations of words; which words correlate more with other words. The chatbot does not "understand" the command to be creative. Rather, the word "creative" in the prompt triggers the words that are associated with it based on the training data. If" creativity "and is associated more with words like "teamwork", and "bingo cards", those have a very high chance of being selected in the responses. Ultimately, chat bots learn associations between words and patterns of their occurrence, and bakes its responses accordingly. It also adds a slight twist to them, further contributing to the chat bot's "creativity".

That aside, in the study we recorded a slight advantage of teacher-generated ideas. However, perhaps it's because teachers naturally gravitate towards the ideas made by their peers since, like them, they are well familiar of the context of each lesson as well as what works and what not. In addition,

in generating teaching ideas, the user of artificial intelligence is not limited to one answer only. They can use more than one prompt, or a single one and then keep customizing and refining it based on the chat bot's responses. I the present study, Chat GPT was only prompted once, which may not correspond to how people actually use chat GPT to aid them. In addition, in teaching, the chasm is large between words and actual practice. An intuitive idea might seem appealing in words, but hard to implement or disastrous in actual practice. Therefore, one should keep in mind that it's better if those ideas have been tested inside the classroom to see their outcome, rather than assessing a hypothetical willingness to try them.

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