

## USING ChatGPT TO HELP MAKE HOTS QUESTIONS QUICKLY AND EASILY

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### Abstracts

ChatGPT Open AI is an artificial intelligence-based machine technology that is trained to be able to mimic human conversation using NLP (Natural Language Processing) technology. In fact, ChatGPT can be used to produce questions with good and effective techniques. Therefore, the opportunity to use this technology is wide open for education in Indonesia, one of which is in helping to make HOTS (high order thinking skills) questions quickly and easily for teachers to practice 21<sup>st</sup> century skills. These skills include critical thinking skills, creative thinking skills, collaboration, and communicative skills. The research method used is in the form of an experiment using a laptop with 4 GB of RAM connected to an internet network and a ChatGPT account which can be created for free at <https://chat.openai.com>. The results of experiments carried out using ChatGPT can produce HOTS questions in the amount of 5 multiple choice questions complete with discussion on optical material that still needed further examination. The total time needed to complete this experiment is approximately 3 minutes, including the time to document the ChatGPT processing results.

#### Keyword:

ChatGPT, HOTS Questions, Quickly, Easily

### Introduction

Preparing students to survive in their future life is the goal of the educational process in schools. Given that there are more and more challenges to be faced in the 21<sup>st</sup> century (Jan 2017; So and Kang 2014). Therefore, education in schools should consider preparing students to face challenges in the 21<sup>st</sup> century. Stevens (2012) classifies the main challenges in the 21<sup>st</sup> century as follows: (1) economic challenges: technological advances have reduced the demand for unskilled labor and most of the current jobs require knowledge and skills; (2) technological challenges: advances in technology, information and communication require major changes in all life such as increasing power and dependence on science and technology, most of the information that is increasingly accessible is often of questionable quality and increases in international mobility of people; (3) social challenges: maintaining a

viable democracy especially in an era of economic anxiety; (4) health challenges: the number of people with mental disorders is increasing due to several factors including conflict and breakdown of families, pressures from education and work, the impact of media and technology, changes in diet and pollution; (5) ecological challenges: a combination of increasing human population, increasing consumption, technological improvements and labor organization have contributed to the breakdown of living systems (such as deforestation, overfishing and loss of habitat), damage to life-sustaining ecosystems, resource depletion as well as increased competition and conflict among humans due to scarce resources.

Students' skills in solving problems are very dependent on what kind of questions students usually work on. The questions given to students must refer to higher order thinking skills (HOTS). This is a demand as well as a challenge for all teachers at every level of education to change the paradigm of making questions from Lower Order Thinking Skills (LOTS) to HOTS (Prakash and Litoriya 2022). The aim is to equip students with the achievement of 21<sup>st</sup> century competencies which consist of the ability to collaborate, think critically, creatively, and communicatively (Binkley et al. 2012). This competence can be achieved if in the process of teaching and learning activities and assessments focus on realizing HOTS abilities.

HOTS is a high-level student thinking ability which includes the ability to analyze, evaluate, and create (Ichsan et al. 2019). A student is said to have analytical skills if he is able to identify questions, distinguish cause and effect factors from a complex problem, and analyze the information received to then identify patterns or relationships. A student is said to have evaluation skills if he is able to make generalizations from an idea, design ways to solve problems and organize parts into new structures that did not exist before (Suryapusitarini, Wardono, and Kartono 2018). Some of these abilities are not abilities that develop by themselves but must be trained through the provision of stimuli in the form of non-routine questions that lead to several HOTS criteria (Atmojo et al. 2017).

Based on the facts in the field, the making of HOTS questions by the teacher is not easy. Based on the results of research conducted by Praja et al (2021) it was found that 21% or 4 out of 19 teachers correctly understood what HOTS was. As many as 16% of teachers understand the definition of HOTS, and 11% of teachers who can make HOTS questions need to be developed to prepare and equip students to face competition in the 21<sup>st</sup> century.

Based on the results of unstructured interviews, some teachers experienced difficulties in making HOTS questions, especially on objective tests. Objective tests such as the multiple choice type have one correct answer while the others are called distractors. In addition to making subject matter, teachers also have to think about how to make a distractor that will trick students. This condition of distracting questions can indirectly train students to think critically. If each item is answered correctly by all students, this indicates that the distractor is not working. Therefore, multiple choice item items can be categorized as having good quality if the overall distractor is functioning (Tarmizi et al. 2021).

Artificial intelligence research laboratory (AI / Artificial Intelligence) with Open AI in the United States has released a chatbot application called ChatGPT useful for assesment and learning (Crawford, Cowling, and Allen 2023; Firat 2022). This machine is a natural language processing (NLP) technology capable of responding to human questions in text form (referred to as prompts) typed into the application (Joseph et al. 2016; Kang et al. 2020). Thus, ChatGPT can be used to make HOTS questions that are not easy to make faster and easier. Based on the ideas that have been presented, the authors experiment with ChatGPT to show that ChatGPT can be used to make HOTS questions quickly and easily.

## Methods

The research method used is in the form of an experiment using a laptop with 4 GB of RAM connected to an internet network and a ChatGPT account which can be created for free at <https://chat.openai.com>. Figure 1 to Figure 4 shows steps for making HOTS questions using ChatGPT.

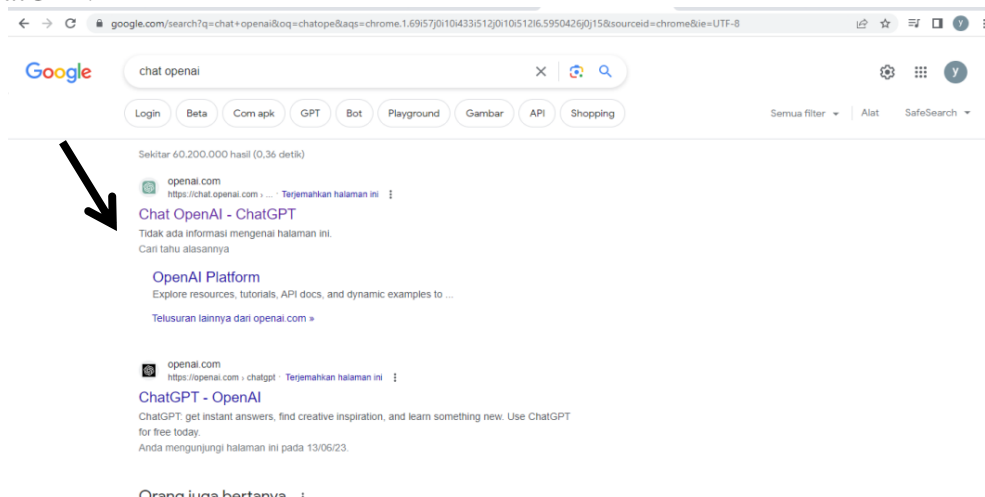


Figure 1. stage 1 is type chat openai on google then select according to the arrow

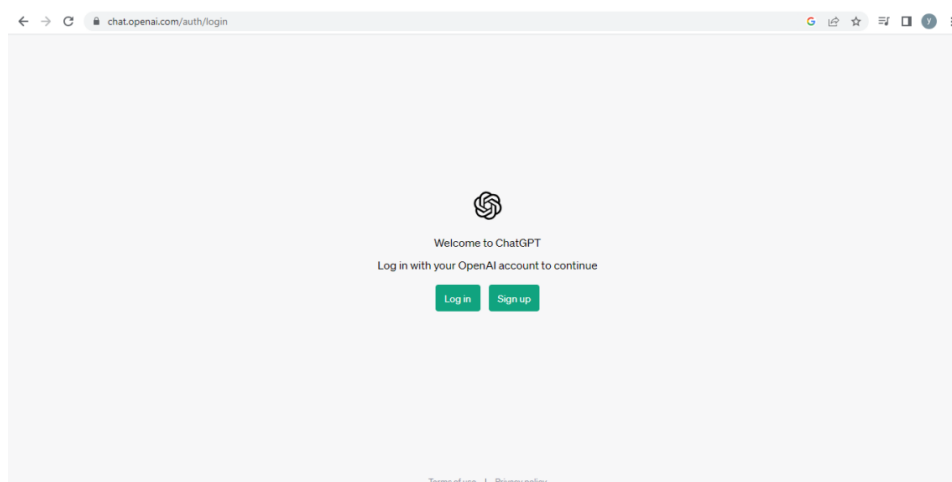


Figure 2. stage 2 is select login

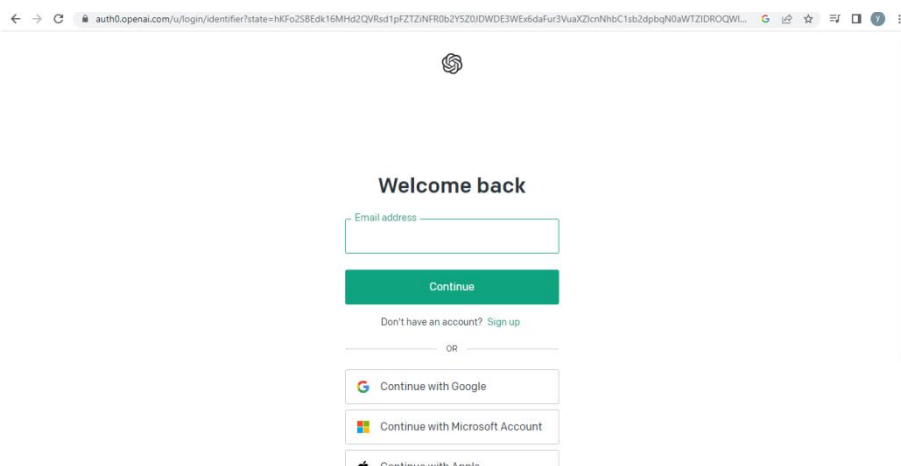


Figure 3. step 3 is enter account and you can log in using a regular account or student

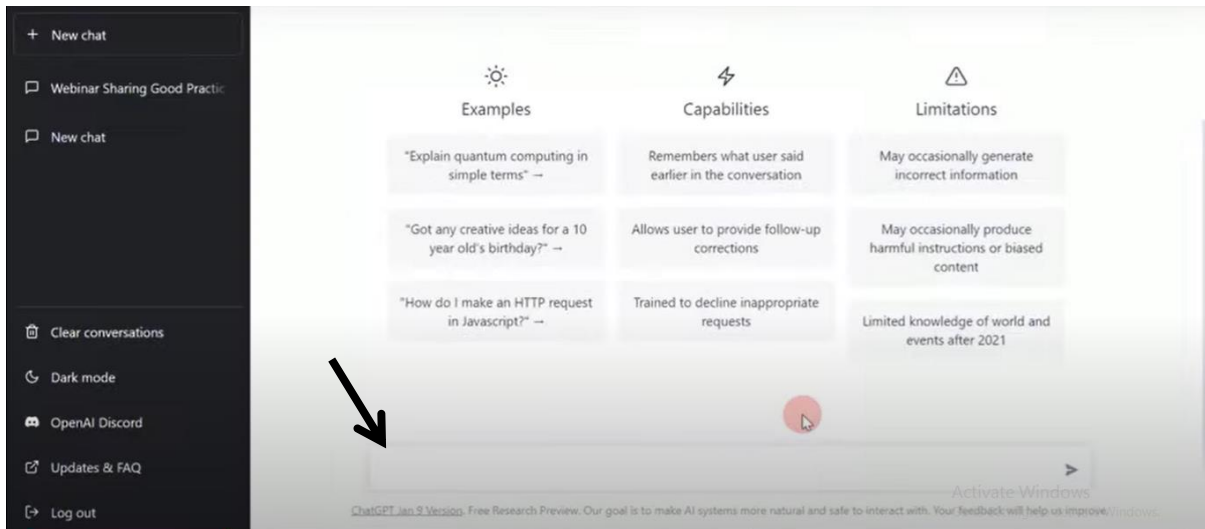


Figure 4. stage 4 write the question

The process for registering a new ChatGPT account can use email, a Google account or a Microsoft account. The experimental steps are as follows:

- a. Determine the topic of writing and formulate prompts to be used.

The author decided to act as a teacher who would make HOTS questions on the topic of optical devices. In order to get the desired HOTS question results, the teacher follows the advice from Account by making an effective prompt, where this prompt must be clarity, focus and relevance. So it should be avoided entering prompts that are overloaded with information, using heroes or terms that are not clear, that are too open, and do not include clear instructions/limits (Akin 2023).

- b. Then the experiment starts with:

The author enters the prompt:

*Make 5 HOTS multiple choice questions with 5 options accompanied by calculations for optical material*

## Results and Discussion

Based on the prompt entered by the author, an example of a response from the Chat GPT is in the form of writing as follows:

1. A concave lens has a focus length of  $f=25$  cm. If the object is at a distance of 50 cm from the lens, then the resulting image distance is...
  - A. 25 cm
  - B. 50 cm
  - C. 75 cm (correct answer)
  - D. 100 cm
  - E. 125 cm

Calculation:

According to the law of a concave lens  $1/f=1/u+1/v$

Because objects are out of focus ( $u = 50$  cm), then  $v=f(1/u+1/f)=25(1/50+1/25)= 25$ cm

2. A concave lens has a focus length of  $f=6$  cm. If the object is at a distance of 10 cm from the lens, then the resulting image distance is...

- A. 15 cm (correct answer)
- B. 25 cm
- C. 50 cm
- D. 75 cm
- E. 100 cm

Calculation:

According to the law of a concave lens  $1/f=1/u+1/v$

Because objects are out of focus ( $u = 10$  cm), then  $1/v=(1/f-1/u)=(1/6-1/10)=15$ cm

3. A convex lens has a focus length of  $f = 20$  cm. If the object is at a distance of 40 cm from the lens, then the resulting image distance is...
- A. -20 cm
  - B. -40 cm
  - C. 20 cm (correct answer)
  - D. 40 cm
  - E. 60 cm

Calculation:

According to the law of convex lens  $1/f = 1/u-1/v$

Because the object is out of focus ( $u=40$  cm), then  $v = f (1/u - 1/f) = 20 (1/40 - 1/20) = 20$

\*because a concave lens is a lens whose focus is in front of the lens, a convex lens is a lens whose focus is behind the lens.

4. A convex lens has a focus length of  $f = 15$  cm. If the object is at a distance of 10 cm from the lens, then the resulting image distance is...
- A. -4cm
  - B. -6 cm (correct answer)
  - C. -2 cm
  - D. 6 cm
  - E. 4 cm

Calculation:

According to the law of convex lens  $1/f = 1/u-1/v$

Because the object is out of focus ( $u=10$  cm), then  $v = 1/f - 1/u = 1/(-15) - 1/10 = -6$  cm

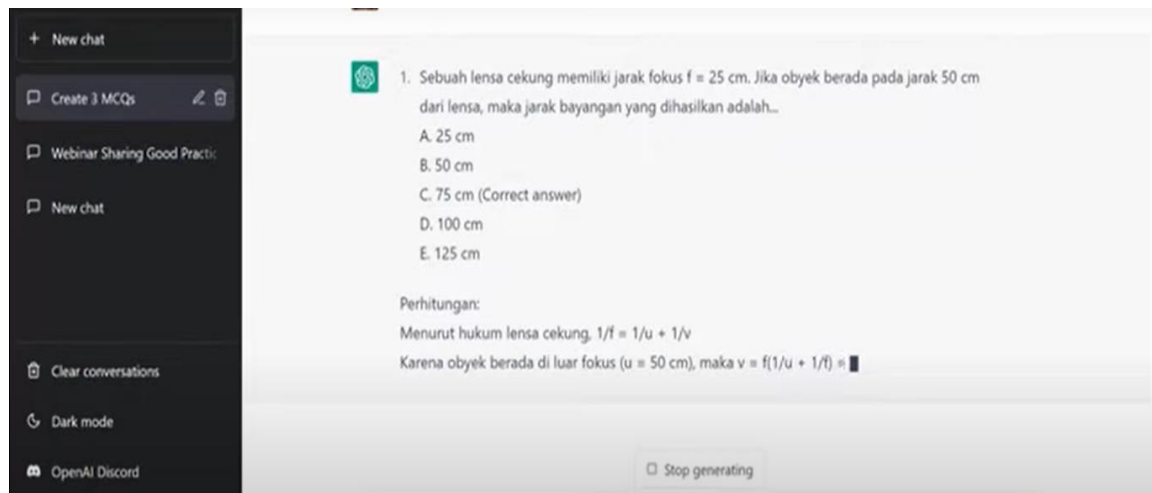


Figure 5. Screenshots of Response ChatGPT

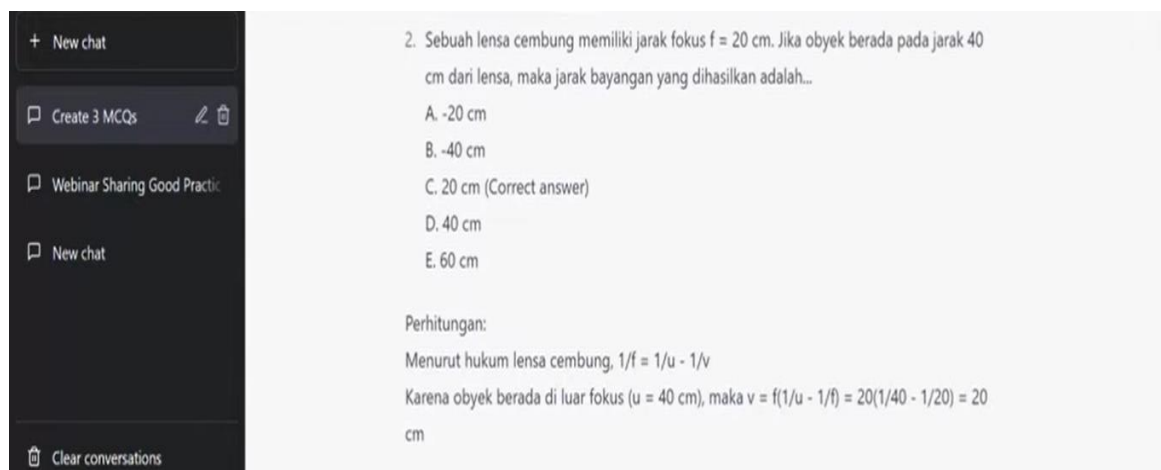


Figure 6. Screenshots of Response ChatGPT

The ChatGPT response is compiled as-is. The generated HOTS questions are accompanied by answers. However, based on the analysis that has been carried out, the questions and answers produced do not have high accuracy, so further examination is required because the accuracy of ChatGPT results is very important. The total time needed to complete this is approximately 3 minutes, including the time for documenting the processing results of ChatGPT processing results, but not including formulating the prompt at the start. The writings of ChatGPT's work can actually be further elaborated so that the number of questions can become more.

Based on the experimental results found, ChatGPT can be used by teachers in making HOTS questions quickly and easily. From the findings of previous researchers by Pratiwi (2022), it can be seen that the obstacles experienced by teachers when making HOTS questions are done conventionally without the help of ChatGPT, including limited time to compose HOTS questions, not understanding how to find and match operational verbs for HOTS questions, selection of basic competencies that are sometimes not quite right, lack of socialization regarding making HOTS questions, and still making questions with the same model.

In the 21<sup>st</sup> century, teachers/lecturers have a great opportunity to make HOTS questions to train students' high-level thinking skills which include analytical, evaluation, and creative abilities (Ichsan et al. 2019) and these skills include critical thinking skills, creative thinking

skills, collaboration, and communicative skills (Stevens 2012). The technology adopted in learning is a form of response to the challenges of lifelong learning needs (Kang et al. 2020). This is because students grow and develop in different times.

In addition, it is hoped that teachers will not be allergic to the presence of AI technology such as ChatGPT, especially teachers who do not understand using AI technology such as ChatGPT. Precisely by trying and using it often yourself, over time a feeling will build up like how to make HOTS questions with the help of ChatGPT.

## Conclusion

ChatGPT is an intelligent machine that is trained to be able to imitate human conversation using NLP (Natural Language Processing) technology. In fact, GPT Chat can be used to generate HOTS questions quickly and easily with prompts that are formulated at the beginning with good and effective techniques. So that the opportunities for innovation using this technology are wide open for education in Indonesia, one of which is in making HOTS questions for teachers. The results of the experiments carried out produced HOTS questions equipped with answers that still needed further examination. The total time required to complete the experiment was approximately 3 minutes, including the time for documenting the results of ChatGPT processing, but excluding the time for formulating the initial prompt.

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