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APPLICATIONS OF CHATGPT IN THE EDUCATION PROCESS

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Abstract: Generative Artificial Intelligence (AI) technologies, such as large language models, have the potential to revolutionize much of teaching and learning in higher education. ChatGPT is a system, easy to use and potentially accessible to the general public, and demonstrates the power of large language models such as GPT-4, where further massive performance increases and wider adoption are expected in the years to come. This technological development can initially be viewed with doubts and uncertainty because it would require a fundamental change in teaching and learning at the university level. So, even if someone who has little knowledge in the use of information technology in teaching still thinks that ChatGPT is not yet effective and consolidated, it is worth reading this paper, and through the theoretical treatment, recommendations, and application examples, you will be convinced of its impact on higher education. The paper provides examples, guidelines, and concrete recommendations for students and teachers to find their own way to deal with ChatGPT and to widely include information technology tools in the educational process. In the preparation of this article, we were based on our experience in information systems, computer science, consultancy, and surveys with lecturers, Postdocs, doctoral candidates, and students who develop subjects of general and professional training in various university branches. We have a positive view of models and generating AI tools like ChatGPT and GPT-4, but as always, there is light and dark, and change is difficult. However, this problem needs to be improved and massified to prepare specialists for the future market at work.

Keywords and phrases: Higher education, ChatGPT, Recommendation, Artificial Intelligence (AI), Student, Teacher

MSC 2010 Classification: Primary 68M25; Secondary 68M12.

1 Introduction

ChatGPT was talked about in the media in early 2023, causing universities around the world to sound the alarm. On March 14, 2023, OpenAI launched GPT-4 as a model that further powers ChatGPT. This significantly improves performance over what has been discussed in relation to ChatGPT during the last months of 2024. GPT-4 significantly outperforms the previous model GPT-3.5 currently in use, scoring an approximate percentage of correct answers. This means that ChatGPT based on GPT-4 gets a higher rating. ChatGPT is an artificial intelligence (AI)-based chat agent that can write essays and various level papers for universities.

These tools can offer the advantages of being permanently available, scalable, and independently accessible, leveraging the potential to address the concerns of many students at the same time while adapting to their individual needs. OpenAI launched ChatGPT as a research preview on November 30, 2022, already reaching a new level of conversation between humans and chat agents, especially when it was introduced to GPT-3.5 as the basic model. Now GPT-4 further expanded this capability.

Despite the general knowledge about the potential power of conversational agents in higher education, ChatGPT brought the discussion to a new level for several reasons. It allows us to qualify the results produced by large underlying language models that exceed what most people thought. ChatGPT, as a user interface for these models, is very easy to use by all interested parties. This was made possible when OpenAI provided free access to ChatGPT, which generated stunning high-quality text, making a significant impact in the field of higher education and many other fields within a few months [1]-[3]. The main part of higher education is learning, with

the aim of how to apply the latest knowledge of its theory and technology and discover new and practical knowledge.

Generative AI systems can generate text, images, or other visuals with great input, so it is not surprising that generative AI fundamentally challenges accepted knowledge, assumptions, and changes in higher education [4]. Large language models are a specific machine learning approach with superior performance. For the tasks it solves, GPT-4 is an example of a large language model. Such models and the systems built on top of them, such as ChatGPT, are impressive but also often controversial. Upon its release, ChatGPT became the fastest-growing app in history, reaching over 100 million monthly users just two months after its first launch. The media called ChatGPT part of the "generative AI explosion" that could revolutionize the way we work, think, and approach human creativity.

In practical application, problems are also noticed in the impossibility to trace the sources of each statement. The program sometimes produces meaningless results, especially when the user is not careful and responsible. A barrage of half-truths can flood, all of which seem reliable and are written using perfect language. Despite these concerns, there is a broad consensus that ChatGPT can potentially transform the way we teach and study, as it can be used for a variety of applications, including writing, translation, professional communication, and personalized learning [5, 6].

ChatGPT is a specific user interface for specific models of major languages. We must refer specifically to ChatGPT, which is at the forefront of the current debate among students, lecturers, and other higher education stakeholders. In addition to ChatGPT, other chat agents and applications that use large language models have similar or complementary text processing and generation capabilities. Further, many other AI tools support other aspects of teaching and learning. An overview of tools for text generation, text translation, audio to text transcription, image generation, image manipulation, variable generation, audio and music generation, audio and music processing, video generation and processing, programming, mathematics, and other elements of learning and teaching are offered in this paper without pretending to exhaust the many and specific discussions of the use of ChatGPT in higher education.

A brief look at the history of higher education and experience from other fields shows that expected innovations are often exaggerated. The present shows that short-term courses and university certificates continue to be highly valued by students, which means that for higher education, the rise of AI tools is an important step of digital innovation. We should not make the possible mistakes if such systems were to pass the university entrance tests and they do not eclipse the traditional experience in lectures, exams, or master theses in universities. Further, we should not neglect their importance for higher education and stop using them. It is good that students no longer write their theses using pen and paper, and it is good that they do not calculate all the statistics by hand or with a pocket calculator [7].

The use of advanced translation programs based on machine learning (ML) such as Translator or Google Translate is standardized in several languages. Google Scholar supports algorithmically navigating scientific literature, many software supports data analytics, and online discussion forums are supporting students in developing software code. Consequently, both students and lecturers are routinely using these tools, and despite some potential downsides, the effect of using such IT tools in higher education is extremely positive [8].

The main reason is that ChatGPT and other generative AI tools can improve higher education. They should become part of the daily lives of lecturers and students in their areas of life beyond higher education. Therefore, we must all join forces to ensure that these students are as prepared as possible for their future careers. At university, students should learn how to use ChatGPT and similar tools purposefully, productively, and responsibly [9]. In this paper, we have aimed to reflect on the extraordinary growing possibilities of generative AI tools in higher education and the potentially harmful effects of their use. This paper can guide students and lecturers to reflect on their teaching and learning to understand the generative capabilities of AI in higher education by focusing on the teaching-learning binomial between students, lecturers, and technological tools.

2 Overview of Generative AI, Big Language Patterns, and ChatGPT

One of the most important chat agents right now is ChatGPT, a tool released by the American company OpenAI on November 30, 2022. Before we go into more detail about why ChatGPT has gained so much attention in a relatively short time, first we need to know the technical basics of ChatGPT and clarify the main terms and constructs accordingly.

Artificial intelligence (AI) is a broad field that includes various techniques and approaches to create intelligent machines that perceive their environment and take action. Machine learning is a subfield of AI that allows computers to learn and improve their performance on a task without being explicitly programmed using algorithms that can identify patterns and make predictions based on data. Generative AI refers to AI systems that generate new data or results, such as images, music, or text, rather than classifying or processing existing data. Typically, generative AI uses machine learning. Large language models are a type of machine learning model that can process and generate natural language text. Machine learning is a type of generative AI because they can produce new text output based on patterns and learn from large amounts of input data [10, 11].

Conversational agents, also known as chatbots or virtual assistants, are AI systems designed to engage in natural language conversations with humans. Conversational agents can use machines as a component to generate text responses that mimic human language and style. ChatGPT is a chat agent that uses GPT-3.5 or GPT-4. GPT stands for Pre-Trained Transformative Generation. It is the acronym of OpenAI used in the name of large language models trained on data available on the Internet. The earliest such models, GPT-1, were released by OpenAI in 2018; the latest - GPT-4 - on March 14, 2023. ChatGPT is a user interface for GPT-3.5 and GPT-4 models. ChatGPT free search preview allows access to GPT-3.5 as of March 14, 2023, while the GPT-4 premium version is fee-based. GPT models are also available via an application programming interface (API) [12].

Innovation in higher education does not come from technology or models in general, but from the use of software systems built on top of technologies and models. Specific software systems, such as ChatGPT, are essential for students and lecturers. Therefore, we often refer to ChatGPT as a specific example of an AI generating system. ChatGPT is impressive and current. However, it is neither the only nor the last as an AI generating system. Therefore, university policies should not clarify the use of ChatGPT specifically, but AI generating systems in general [13].

A major advantage of the large language models such as GPT-3.5 and GPT-4 underlying ChatGPT is their ability to process and contextualize text information and generate appropriate responses. GPT-3.5 is purely text-based: it accepts text input and produces text output. This text can be natural language or computer code. Beyond that, GPT-4 also accepts images as part of the login request. It can be documents with text and pictures, diagrams or screenshots. Therefore, GPT-4 includes elements of computer vision and is more than a large, pure language model. The performance and accuracy of the models are significantly affected by the variation in the number of model parameters and the size of the training data. A larger set of training data leads to a wider and more diverse language model, resulting in enhanced skills. According to OpenAI, GPT-3.5 is based on a deep neural network model with 185 billion parameters, which are adjusted through machine learning. In contrast to the earlier models from OpenAI, GPT-1 and GPT-2, which aimed to generate human-like conversations, GPT-3 was already considered the most advanced and capable of the models due to its apparent size larger and scaling of the data and parameters used in its training. GPT-3.5 is the successor of GPT-3. GPT-4 is the next evolutionary step. Both models work in English, German and many other languages, including Albanian. However, like any IT system (and any human), ChatGPT and the underlying models are not perfect. A fundamental limitation to bear in mind is that although the result may appear convincing, it is not necessarily factually correct. GPT models and therefore ChatGPT sometimes "hallucinate". Natural text, academic references, and the like may seem perfect at first glance, but they lack truth or refer to non-existent objects or earlier texts. For example, it can compose fake academic papers using new configurations of existing titles, media and authors. While this concern applies to all GPT models, in our initial tests we found that GPT-4 has far fewer hallucinations than GPT-3.5 [14, 15].

One of the core features of GPT-3.5 and GPT-4 is their ability to consider the contextual

information of a conversation when generating the response. This allows ChatGPT to maintain a conversation flow, but its ability to maintain that flow continuously is limited. This is possible using a so-called "self-attention mechanism", which means that the models can weight the importance of different words and phrases in the input text based on their perceived importance. The scope of the patterns context is given by the number of so-called input tokens. GPT-3.5 has a token limit of about 5,000 arguments (about 3,500 words in model requests and responses), GPT-4 about an impressive 32,000 arguments. Therefore, GPT-4 is much more robust in considering the context that affects the length of text that can reasonably be generated. Based on GPT-3.5, ChatGPT can - depending on the topic and request - reasonably produce a paragraph of text or several paragraphs. Using GPT-4, ChatGPT can produce entire chapters. It is easy to predict that such models will eventually be able to create text the length of an entire bachelor's or master's thesis. However, even if the text is linguistically perfect, its content does not necessarily show the same quality. Furthermore, ChatGPT cannot fully appreciate the nuances of a conversation since it is still a machine learning model and is simply trained on large amounts of input data [16, 17].

A benefit of ChatGPT is its simple application, which is possible through a simple user-machine (computer) interface that does not require in-depth knowledge of information technology equipment. ChatGPT is a ready-to-use service made available as a dialog system that can be easily interacted with. Immediately after invoking ChatGPT, the user is presented with relevant information about the topic of interest. Currently, OpenAI provides ChatGPT based on a model where the use of ChatGPT is free if the user accepts GPT-3.5 as the underlying model, somewhat delayed responses, and unavailability at times of high demand. A premium version with higher capacity is now available for a fee to handle a high volume of requests while ensuring fast response times. Further, the premium version allows access to GPT-4 with its advanced context-aware capability and the option for image-based requests. Microsoft and others use the API provided by OpenAI to integrate large language models into other software systems beyond ChatGPT. In Figure 1, the ChatGPT user interface is given in the e-Albania platform that is being applied from January 2024 and is soon expected to have a virtual assistant [18].

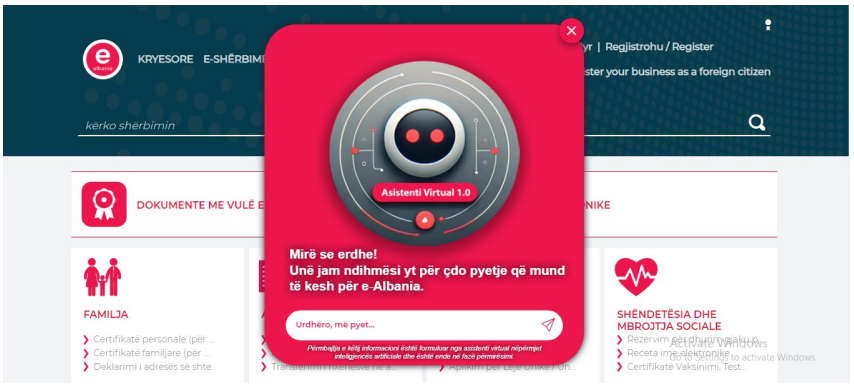

Figure 1. ChatGPT user interface on the e-Albania platform (view recorded on January 15, 2024).

3 Attention to Students

Conversational agents are valuable tools for university students, helping them with academic work, saving time, providing access, improving critical thinking skills, and improving language skills. In this section, we critically reflect on how students can and should use ChatGPT, as an example of a tool based on large language models, to maximize potential benefits and avoid risks. This includes teaching educators the limitations and dangers of ChatGPT. In summary, we can single out nine recommendations for students, detailed below.

Recommendation 1: Comply with exam guidelines and regulations

Before discussing the efficient possibilities of working with ChatGPT or other AI-based tools, we would like to emphasize the need to respect the relevant guidelines of the Ministry of Education in the use of AI-based tools and the individual exam regulations of each university, school, and course of study. In addition, students must follow the rules regarding citations and good scientific practice. Finally, they must indicate whether a text, coursework, etc., was created by AI and what information was provided to AI.

Recommendation 2: Reflect on your learning goals

Higher education is more than acquiring field-specific skills. It also involves cultivating and enhancing essential skills such as critical and structured thinking. Generative AI increases the need for these skills and affects the chances of developing them during your studies. Critical thinking refers to the ability to evaluate information, ideas, and arguments systematically and rationally. It involves questioning assumptions, analyzing evidence, and considering multiple perspectives to arrive at well-reasoned conclusions. Given that generative AI systems like ChatGPT produce large volumes of text, which may need to be reviewed for content, critical engagement with texts is more important than ever.

Recommendation 3: Use ChatGPT as a writing partner

When promoting ChatGPT and asking if one could use it to write assignments for students, AI noted that it could not replace critical thinking and creativity, which are essential components of writing assignments. Therefore, students in higher education should only use ChatGPT as a complementary tool, such as Wikipedia, Google, and other search engines, or translation programs. ChatGPT will never be the author of a work and responsibility for written content will always rest with the human author, in this case, the student. Since ChatGPT is not the author, ChatGPT cannot be cited as a source. Furthermore, because ChatGPT can always generate new data, the answers it provides are not verifiable.

Recommendation 4: Review and edit AI-generated content

Although ChatGPT can generate coherent and well-structured text, students should take responsibility for reviewing and editing the content. Texts generated by AI should be critically evaluated for accuracy, relevance, and alignment with the intended message or assignment. It is essential to ensure that the content aligns with the course material and reflects the student's understanding of the topic.

Recommendation 5: Avoid over-reliance on AI tools

While AI-based tools like ChatGPT can be incredibly useful, over-reliance on them can hinder the development of fundamental academic skills. Students should balance their use of AI tools with independent research, analysis, and critical thinking.

Recommendation 6: Consider ethical considerations

Using AI tools in education raises ethical issues that should be considered by both students and educators. One of the primary ethical concerns is the potential for misuse or plagiarism of AI-generated content.

Recommendation 7: Encourage collaboration with teachers

Students should also consider using ChatGPT in collaboration with teachers for feedback and guidance. Teachers can help students refine AI-generated content, clarify concepts, and address misunderstandings.

Recommendation 8: Use ChatGPT for research and idea generation

ChatGPT can also be a valuable resource for generating ideas and conducting preliminary research. Students can use ChatGPT to generate potential thesis topics, outline key ideas, or suggest further reading.

Recommendation 9: Stay updated with AI developments

As AI technology continues to evolve, it is important for students to stay updated on new features and advancements in tools like ChatGPT. This helps them adapt to changes in AI capabilities and learn how to use these tools more effectively.

Recommendation 4: Use ChatGPT as a learning partner

Another useful application of ChatGPT is using ChatGPT as a learning partner for university students. Since outstanding chat agents like ChatGPT are accessible 24/7, they offer students numerous opportunities to help them gain new knowledge or test existing knowledge. Since many best practices are already circulating on the Internet, we compiled and tested what we consider to be the most useful by designing during the month of February 2024 two learning tests with ChatGPT 3.5 with about 150 questions-answers for two subjects from "Information Technology" and “Computer architecture” asking for four answer alternatives (A,B,C,D) where one was correct. The test in 90% of the questions-answers was acceptable.

Recommendation 5: Repeat and chat with ChatGPT

When using ChatGPT, it is sometimes unclear how to use it effectively. Providing ChatGPT with accurate and specific information is essential to receive the desired text and information. Since ChatGPT relies only on instructions and words, providing additional information and context, including purpose and information on target audience, unique position, and intended tone, is essential. If the text or result is unsatisfactory, users can request more information and provide detailed feedback to improve the model’s response and generate a better match for their requirements.

Recommendation 6: Summarize learning material with ChatGPT

You can use the functionality of ChatGPT with videos and texts, such as long notes from a lecture or a long piece of writing that is difficult to read. This can be a useful way to analyze learning materials and identify important aspects of the material. In doing so, it should be borne in mind that a summary always lacks details and that these details may be necessary. Therefore, this function should be used with caution.

Recommendation 7: Improve encryption with ChatGPT

ChatGPT can be used not only as a learning or writing partner, but also as a partner to generate or debug codes (programming). Upon proper request, ChatGPT can provide students with coding suggestions. These code snippets can then be used as a starting point for a project or task. ChatGPT can be a great tool to help debug code. Students can share their code with ChatGPT and the model can help identify errors and suggest possible solutions. Additionally, ChatGPT can help optimize your code to make it more efficient by suggesting better data structures and algorithms.

Recommendation 8: Beware of risks when using ChatGPT

In addition to the advantages of using ChatGPT for creating scholarly text, users should be aware of potential sources of error and misconduct. Thus, although we recommend using AI-based tools, such as ChatGPT, for creating scientific text, we encourage students to reflect on

any AI-generated output. This applies not only to the text, but also to the code generated by ChatGPT. In some cases, ChatGPT created non-existent resources, posing the risk of spreading false information. Thus, students must verify every statement made by ChatGPT, which is a significant workload. Additionally, there are substantial risks associated with plagiarism and copyright infringements. One is responsible for writing if one submits work under one's own name (eg, a term paper or a thesis). One is still responsible for the work if they use content created by ChatGPT or similar tools and include it in their work. One accepts praise if the work receives praise (eg, a good grade). One must accept blame and other negative consequences if the work causes blame - eg, for plagiarism, copyright infringement, unethical discrimination, illegal content or errors. For better or worse, the author is responsible for his use of the tools.

Recommendation 9: Read this checklist before using ChatGPT

ChatGPT and other generative AI-based tools will change the way students learn, write exams and study for tests. In the following, we summarize examples of recommendations that should be considered when working with ChatGPT:

- Review university rules and regulations regarding generative AI, models language majors and ChatGPT.
- Understand the capabilities and limitations of ChatGPT.
- Check if using ChatGPT is an advantage or if the task requires learning basic knowledge.
- Verify that the results provided by ChatGPT are reliable and accurate and reflect the findings.
- Consider which topics can be intelligently linked to produce new knowledge.

The variety of smart use cases for ChatGPT is huge, and new ways to use it will come over time. Students should empower themselves to use ChatGPT responsibly, so that the first reflex of (public) perception is not the possibility of cheating, but the possibility of learning new things that will lead to preparing students ready for digital work.

4 Attention to teachers

The appearance of new educational technologies often arouses strong emotions, in the case of ChatGPT, experts also speak of an "educator's dilemma" between banning these technologies or promoting their use. Although the use of conversational agents and ChatGPT, especially in higher education, is diverse, we intend to examine in more detail two main areas of application for teachers and lecturers:

(i) the teaching process

(ii) the assessment process

5 Teaching

There are many potentials for the teaching side in all phases of teaching-related activities, from planning, implementation to evaluation. In the following, we present various recommendations where generative AI systems, and especially ChatGPT, can support lecturers in their teaching activities. We illustrate this with five recommendations for lecturers about teaching, summarized below [26]-[29]:

Recommendation 1: Reflect on which learning objective you are pursuing in your teaching

Before thinking about how to use ChatGPT to support your teaching, it is essential to determine the actual learning objectives of your course. As mentioned earlier in the section on students, learning objectives in higher education can vary depending on the field of study and the subject.

While critical thinking and structured thinking are considered essential goals in higher education, you can use ChatGPT to develop these skills in your students by exploiting the limitations of generative AI, such as the potential for false information or the potential to obtain low quality text. By reflecting on the output generated by AI tools and providing ChatGPT with purposeful prompts and sufficient information, students can practice structuring their arguments logically, which is an essential component of structured thinking. This interaction with generative AI can effectively develop students' skills in critical reflection and iteratively structured thinking. Today, creating a high-quality product with ChatGPT depends on creating the right requirements. The ability to create and refine requirements that are tailored to specific tasks or goals can be crucial in achieving the desired result.

Recommendation 2: Create learning materials with ChatGPT

ChatGPT can be a valuable tool for personalized learning in higher education. In addition to supporting lecturers with various classroom tasks, ChatGPT can create personalized exercises and quizzes, provide feedback and generate tailored educational materials that match the student's learning style and progress. In addition, ChatGPT can help in developing lecture ideas, designing workshop plans and module descriptions, designing texts, etc. Another potential application of ChatGPT is to assess students' prior knowledge using AI.

Recommendation 3: Support students with quizzes

Quizzes on the content of a course can support students and assess their level of learning. ChatGPT prompts can help educators create quizzes. Such prompts can (and likely will) also be used to generate exam questions. While this can be an exciting feature to stimulate ideas about exam questions, educators cannot rely on the questions and suggested answers being correct. Therefore, they must do more than accept and use them. This is true for all uses of ChatGPT, but it is essential when it comes to exams (See recommendation 4.5 in point 3 - Attention to Students).

Recommendation 4: Promote learning with ChatGPT

ChatGPT can not only help lecturers design course materials, but also promote learning by overcoming three challenges that are usually difficult to address in classrooms: helping students apply their knowledge to new situations, showing them that they may not know as much as they think they do; and teaching them how to think critically about information. One way to overcome teaching challenges is to incorporate ChatGPT as a learning tool. This approach allows using the strengths and weaknesses of AI to enhance the learning experience by integrating ChatGPT into the curriculum.

Recommendation 5: Encourage students to use ChatGPT

The way teaching is developed in higher education must adapt to technological developments and the different opportunities they offer. In this sense, ChatGPT is seen as a support rather than a threat. Lecturers should encourage students to use ChatGPT creatively and critically to improve, extend or change their texts, but not to replace them with plagiarism. This article can help inform students about the possibilities and risks of using ChatGPT and similar tools. By teaching students how to use these tools effectively, educators can equip them with important skills for their future careers, while also emphasizing the importance of academic integrity and originality.

6 Student Evaluations

Concerns about ChatGPT's impact on written assessments in higher education are common. Some lecturers worry that students may submit AI-generated essays undetected by plagiarism detectors, with ChatGPT producing text that reads naturally, making it harder to differentiate from human-written work. Traditional plagiarism detection tools are ineffective at identifying text generated by AI models like ChatGPT, as they are designed to spot copied material from

scholarly sources. While tools such as the OpenAI Text Classifier have been developed to detect AI-generated text, they currently show a recognition rate of only about 26%. This limitation underscores the need for alternative evaluation methods. Furthermore, concerns arise from ChatGPT's inability to understand context and its reliance on predicting the next word in a sequence. These limitations could lead institutions to adopt policies that prohibit AI use, but given the rapid technological advancements, such policies might soon be unsustainable. Instead, universities and educators should focus on ensuring responsible AI use, tackling potential challenges rather than restricting AI technologies. Below, we present strategies educators can employ to address the challenges of ChatGPT in assessments and adapt to changes in higher education evaluation methods.

7 Results

7.1 Recommendation 1: Design Exams Carefully with Regard to New Technological Possibilities

Exams that require students to write by hand or use pen and paper in controlled environments are traditional methods for evaluating knowledge. However, these approaches may be outdated, as they often do not reflect students' actual learning. The trend toward open-book or take-home exams, accelerated by the Covid-19 pandemic, reflects a shift in how assessments are conducted. In such settings, instructors should pre-test exam questions with ChatGPT to ensure their integrity:

- **High-quality questions**: If ChatGPT can generate high-quality answers, consider reformulating or discarding these questions.
- **Recent events**: Focus exam questions on current events or phenomena, as ChatGPT's knowledge is limited to data up to September 2021.
- **Clear guidelines**: Indicate which tools are allowed during exams (e.g., ChatGPT).

These suggestions have limitations, as AI models evolve, but they provide a starting point for rethinking exams in the context of generative AI.

7.2 Recommendation 2: Ask Students to State How ChatGPT and Other Tools Were Used

Monitoring the use of AI tools during take-home exams is challenging, but requiring students to declare whether and how tools like ChatGPT were used can increase accountability. These statements should include responsibility for any potential errors, plagiarism, or copyright violations introduced by AI-generated content.

7.3 Recommendation 3: Revamp Evaluation Formats

ChatGPT's capabilities have raised concerns about its potential to undermine traditional assessments. However, its limitations also present an opportunity to innovate evaluation formats. ChatGPT's inability to create truly original ideas highlights the need for assessments that foster critical and creative thinking, such as:

- **In-class exams**: Specific assessments that require students to participate in class.
- **Oral presentations**: Assess speaking skills and comprehension through discussions.
- **Group projects**: Encourage collaboration among students to complete tasks.
- **Creative assignments**: Ask students to create websites, videos, or animations as part of their assessment.

These formats promote skills beyond what ChatGPT can replicate, encouraging more personalized and meaningful evaluation.

7.4 Recommendation 4: Rethink the Oversight Process for Assignments

Given ChatGPT's ability to generate high-quality text, it is nearly impossible to discern whether a student or AI produced certain passages. Therefore, instructors should place more emphasis on the process through which assignments are created:

- **Supervision of tasks**: Require students to document their work steps during the process.
- **ChatGPT usage disclosure**: Ask students to state how they used AI tools, if applicable.
- **Oral defenses**: Require a presentation of the final work to ensure the student has grasped the content.

These steps help ensure that students engage with the material and gain expertise in the subject matter.

7.5 Recommendation 5: Revise the Assessment Criteria for Assignments

Since AI tools like ChatGPT excel at generating coherent text, assessment criteria should shift away from focusing solely on writing quality. Instead, evaluation should emphasize:

- **Research question**: The uniqueness and relevance of the research question.
- **Theoretical background**: The depth of the theoretical framework and references.
- **Coherence**: The logical flow of ideas and alignment with the research question.
- **Unique contributions**: Theoretical, empirical, or technical contributions beyond summarizing existing literature.
- **Personal reflections**: Include personal insights or learning logs.

These criteria place greater emphasis on originality and the student's thought process, making it harder for AI tools to replace authentic student work.

7.6 Recommendation 6: Implement Guidelines for Avoiding Plagiarism and Copyright Infringement

As AI tools become more adept at generating text, traditional plagiarism detection methods are insufficient. Educators must establish clear guidelines for avoiding plagiarism and ensuring that students understand the importance of academic integrity. This includes educating students on proper citations and the ethical use of AI tools like ChatGPT.

By revising assessment methods and embracing new technologies, lecturers can adapt to the evolving educational landscape while maintaining academic standards.

8 Recommendation 7: Teach Students to Use ChatGPT Properly

Incorporating AI tools like ChatGPT into higher education is not just a threat to conventional assessment methods, but can also help boost students' academic performance. Since not all students have strong writing skills or may encounter language barriers, using large language models such as ChatGPT can promote equity and fairness in the educational environment. By providing students with a means to generate well-composed texts, students can demonstrate their knowledge and understanding of a topic rather than being handicapped by writing deficiencies or language barriers. Therefore, AI technology can be instrumental in promoting inclusion and excellence in higher education.

To help students master the use of AI, lecturers can redefine their curriculum and thereby explicitly teach the use of AI. This may include:

- Include subject-specific reflection on the impact of AI on the curriculum.
- Develop study programs focused on AI in science, the ethical implications of using AI, and the creation of knowledge through AI systems.
- Redefine core competencies in classrooms and reflect on what should be tested within each subject.

9 Recommendation 8: Enforce the "Rules for Vehicles"

AI tools like ChatGPT have tremendous potential to uncover new approaches to pedagogy. However, while skillfully generating reliable information, AI runs the risk of spreading false data, fabricated quotes, inaccurate information, plagiarism, and the like. Students must have adequate knowledge of the subject under consideration to achieve satisfactory results. Creating a transparent policy governing the implementation of AI in higher education represents a crucial step towards fostering a learning environment where AI is embraced responsibly and openly. Thus, “Rules for Tools” can help build an AI policy, where rules for tools can include:

- In general, students can use all types of media and tools, with the use of said tools depending on the requirements of the course.
- Students are responsible for their own achievements, as AI tools such as ChatGPT, although capable of generating well-composed texts, may contain errors and violate regulations or norms.
- It is mandatory for students to report the aids used during a course, for example by listing the tools, the areas of application of these tools and recording, for example, the requirements when using AI tools such as ChatGPT.
- Exceptions to the prescribed rules may be made, such as the prohibition of tools in specific learning or assessment situations, which will be communicated to students in advance.

10 Conclusions

As AI becomes more pervasive in everyday life, students and educators must use AI tools to be productive and gain important digital skills. Higher education is forced to renew its educational structures, therefore, teaching and learning to change drastically. OpenAI, Microsoft, and many others in academia and industry are working on higher education, so what we see with the current version of ChatGPT is likely to be just the first small step on a big path toward increasingly powerful generative tools. Powerful AI in higher education and beyond.

Teaching, assessment, and learning innovation is only one area in a more complex higher education landscape. As technology develops, the potential of generative AI goes beyond "teaching-learning" between students, educators, and technical tools. It will transform the entire student life cycle, including admissions, enrollment, career services, and further areas of higher education management.

The easy access and rapid deployment of ChatGPT, along with the associated challenges in learning, assessment, and teaching, have shown how quickly traditional models can be disrupted by technology. We must be aware that ChatGPT can change the expectations of technologies of the future of AI, especially conversational agents, whether in terms of interaction or information quality.

On a macro level, universities should be mindful of potential social inequality when tools such as ChatGPT are only available for a service fee. On the other hand, we should not expect every IT-based service provided over the Internet to be free. From a societal perspective, it is essential to ensure that all students have access to the same tools and resources to successfully complete their education.

With a growing number of necessary cloud-based tools requiring fees instead of open-source software installed on premises in university data centers, ChatGPT adds to an ongoing discussion about funding digital transformation in education.

As generative AI continues to advance, it is crucial to explore how it impacts the development of these skills in higher education. With AI’s ability to generate and deliver information, there is a risk that students will become passive receivers of information rather than active thinkers. Universities should encourage broad and multi-perspective dialogue between the many actors in higher education.

- They should include all faculties and disciplines as different fields have different traditions, requirements, and opportunities, which should be reflected in each university’s approach to generative AI.

- They should include their experts from information systems, computer science, data science, and related disciplines who have been researching IT-based innovation and digital transformation for years and decades and in many cases, also researching generative AI. They can contribute to the knowledge of technologies and the transformation process and have first-hand experience of teaching at their university.
- They should involve their career centers and representatives from industry and society to inform the dialogue with prospects on the required educational profiles and skills.
- They should include university didactics experts who bring important perspectives on learning objectives, teaching formats, assessments, and the like.
- They should involve legal experts to examine the legal possibilities offered by the current legislation and university regulations and the necessary changes to make possible and legally sound the desired use of AI generating tools.
- They should include directorates, university offices that administer study and teaching. These are important for processes that must provide fair, efficient, and high-quality teaching.
- They should involve the university's IT department, which can be consulted on access, infrastructure, licenses, IT security, and the like.

Together with all these actors, universities should engage in a dialogue on how to promote and use ChatGPT in the short term and other AI generation tools in the medium term. The results of the dialogue should lead to multi-perspective knowledge resulting in regulations, guidelines, leaflets, guidelines, and implementations. If appropriate, it can be useful to talk to external experts, exchange experiences with other universities, talk to the responsible supervisory authority and policy, and seek the necessary resources for excellent university education.

To summarize, integrating generative AI tools like ChatGPT into higher education requires a significant educational transformation that cannot be achieved overnight. While there are many ideas and discussions about the management and use of such tools, lecturers must first learn how ChatGPT and comparable tools work and modify their teaching methods, content, and processes accordingly. Moreover, changes in exam formats cannot happen immediately, but require careful development and adaptation according to exam regulations.

As such, integrating ChatGPT into higher education will require patience and careful planning to ensure its successful implementation. Students don't have to wait for university-level lectures to end and lecturers to adjust. Instead, we suggest that students actively engage with generative AI. If they haven't used ChatGPT yet, they should get a free account and get first-hand experience with the possibilities and limits. They need to reflect on their learning goals, methods, and processes and engage with other stakeholders in higher education to shape the dialogue on AI-enabled higher education.

While we urge lecturers and students to act on ChatGPT and offer recommendations to them, it is important to note that their use of ChatGPT must comply with legislation, university regulations, good scientific practice, and terms and OpenAI terms. If so, this paper will hopefully provide food for thought regarding the use of generative AI, large language models such as GPT-4, and tools such as ChatGPT in higher education [30]-[35].

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