Designing Assignments for University Students in the Age of AI: Examples from Business Finance Education

György Komáromi

Faculty of Finance and Accountancy, Budapest Business School, University of Applied Sciences
Buzogány u. 11-13, Budapest H-1149, Hungary
Tel: 00 36 30 757 3433 E-mail: komaromi.gyorgy@uni-bge.hu

Abstract
One of the key details of the age of advanced artificial intelligence (AI) systems, such as ChatGPT, is how to create efficient and effective assignments for university students from now on. This paper proposes the reconsideration of usual in-class and out-of-class tasks in the context of the 4C model of learning. Due to the presence of AI those types of assignments will likely become more prominent in higher education that require the 4C: creative thinking, communication, collaboration, and creativity skills. This paper aims to contribute to the wide discussions of the subject by providing some examples: information problem tasks (tasks with incomplete, overflowing, misleading information), problems to find and to structure (one-sentence case studies/"one liners"), oral interpretations of analyses and solutions (video presentations and competitions), and hand-on experience (online, paper & pencil experiments)[i].
Keywords: higher education, artificial intelligence (AI), teaching methodology, 4C model of learning, in-class and out-of-class assignments
DOI: 10.7176/JEP/14-18-15
Publication date: June 30th 2023

1. AI and education
The development and availability of advanced AI systems, such as ChatGPT, is having a profound impact on many segments of society, including education (Farina & Lavazza, 2023). The public launch of ChatGPT on 30 November 2022 was accompanied by unprecedented interest (Kasneci 2023), also by educators with an outstanding increase in the number of scientific articles on the subject[ii]. Whichever side of the issue we observe, two things are quite certain: first, AI is and will be with us in the future, so we must learn to get along and to cope with it, and second, the new environment requires us to rethink the fundamental issues of student learning and university education.

- What, why, how do we teach? What is the knowledge transferred to students?
- How do we assess students' performance?
- How do we properly regulate different areas of education?
- How do we create appropriate and effective forum for developing teachers' knowledge and sharing their experience?
- What and how are the competences, behavioral patterns, and attitudes of students developed?
- How do we facilitate meaningful exchanges of views, debate and consensus between students, teachers, university administration, and other stakeholders on current issues?
- What sort of research should be carried out on the needs of the recruitment market (prospective employers) in terms of the knowledge, competences and skills of prospective graduates they expect?

As a starting point for defining the essential and achievable goals of education, we take the 4C model of learning (see Figure 1) , which identifies the skills that are of paramount importance to an individual's personal and professional success in the 21st century (National Education Association 2012).

Figure 1: 4C model of learning
Skills students need in 21st century to succeed
Critical thinking, problem solving
Communication
Collaboration
Creativity

In the last decade, the 4C model of learning has been shaping and influencing not only primary and secondary education, but also higher education strategies (Kivunja 2014). The changing environment should in any case put education-learning issues on the agenda from time to time for both educators and the university community, and for the time being, the emergence of AI is a compelling reason to carry out a fundamental reconsideration.

One of the key detailed issues that this paper will focus on is how to create effective and efficient assignments for university students.

2. Traditional tasks with new emphases

A comprehensive study by Kasneci et al. (2023), among others, states that it is essential to rethink and reassess traditional tasks, including purpose, content and learning outcomes, in university-level teaching, and how to enhance students' engagement, involvement, complex and critical thinking, and at the same time how to improve the effectiveness and efficiency of teaching and learning.

The framework of the 4C model implies that student tasks are more appropriate for the new age if the elements of the 4Cs are present in the performance of the task. The way in which the curriculum and knowledge are delivered will change, and the use of 4C skills will definitely increase the effectiveness and success of the task.

The integration of AI tools such as ChatGPT into teaching and learning processes is an inevitable step (Komáromi 2023, Rudolf et al. (2023), Zhang 2023), as ignoring or prohibiting them for all task solving will simply not lead to optimal results. On the one hand, in many cases, the use of AI cannot be physically prevented, and on the other hand, the ban would prevent both teachers and students from benefiting from the advantages of AI (Mollik et al. 2023).

It is also not the goal to make every task given to students "ChatGPT-proof", i.e. to set up complex or difficult tasks that AI is not yet able to fully solve. Firstly, it is pointless, because the unimaginable speed of self-learning in AI systems means that more and more complex and difficult problems are being solved by AI systems every day (Geerling et al. 2023). Secondly, this strategy is not pragmatic, because, on the one hand, students need to acquire a significant part of the knowledge that AI possesses, and on the other hand, students need the knowledge to be able to check, revise and correct solutions or answers proposed by AI.

We need to have a different approach to tasks we do in class, out of the class, and for assessment too. On this basis, the following grouping has been drawn up, which lists the types of tasks and ways of setting up tasks, with additions that can address possible problems and questions related to the AI.

Suggestions and solutions from the currently available and expanding literature (Kasneci et al. 2023), online articles (Lindsay 2023) and academic guidelines (Charlotte University 2023, Georgetown University 2023, Lee College Library 2023) are supplemented by my own experience of teaching Finance related courses.

Out-of-class, homework and AI
- preparing and evaluating homework and practicing exercises with AI
- individual or group project work with ongoing documentation (blogging), progress reports (log), presentation of partial results
- oral presentation or video presentation instead of written reports (could be a multimedia project)
- writing essays or analyzing current events or current news
- rewriting, (re)editing, (re)correcting, checking references (including how to refer to AI)
- simulation games projects (online)

Classroom tasks and AI
- problem solving in groups excluding AI,
- writing essays, short tests excluding AI,
- solving numerical problems, text exercises, case studies which contain information problems: redundant, incorrect or missing data,
- one sentence case study ("one liners"): finding the problem, finding a solution strategy, exploring different scenarios,
- classroom games (gamification), simulations: economic or financial experiments online and offline (paper & pencil experiments)
- checking the problem or solution produced by the AI (find the error)

Assessment, evaluation and AI
- wide variety of exam papers can be generated based on classroom exercises,
- questions focus on a subset of the problems
- involving students in peer assessment (competition, peer reviews)
- assessment of assignments, essays, projects by AI

The above is not an exhaustive list, of course, but there are examples of ways in which AI can be integrated into creating and evaluating tasks and assignments. In the ChatGPT era, the way and process of information gathering, and assessment is a key element in the design of tasks for students. The search for relevant information, editing of information, problem finding & structuring, personalization, interpersonal interactions and direct, hands-on experience are noticeably transformed and brought to the fore.

In the first semester of 2023, most educators will encounter the direct and immediate impact of AI not only on a theoretical level, but also in practice. Considering the drastically changed teaching and learning environment, hereby some types of tasks and field-tested exercises are presented that:
- have information problems, or
- focus on defining problems and possible strategies for solving them, or

- present or interpret the problem or issue in an efficient way, or
- are designed to provide direct experience or insights.

2.1 Information problematic tasks

General description: calculative or theoretical tasks, case studies, which contain an information problem.

Information problem: contains redundant, incorrect, misleading, unclear data or argument, or missing data or conditions.

Aim: to prepare students for incomplete information tasks, to identify the information problem, to solve the task by eliminating the problem.

The two examples below were solved as a practice exercise in the Finance course[iii], only after the computational basics of present value calculation had been taught. In addition to practicing the knowledge of how to solve a given problem, the two examples prepare the student for possible information problems which students must recognize and either ask for clarification of the problem or make own assumptions to solve it.

Example 1:

Over the next 10 years you will receive $1,500 if the expected return is 10%. How much is this cash flow worth today?

Example 1 is a simple present value calculation problem given the future cash flow ($1,500) and the interest rate to be used for discounting (10%). However, it is not clear when the cash flow will actually be received. We could receive it in any year, or typically in year 10 (at the beginning or end of the year), or we could understand the problem as receiving $1500 per year.

To solve the problem, it is therefore necessary to clarify the questions above. Teachers wait till students ask for more information, and then we set the assumptions (e.g. that we receive the cash flow at the beginning of year 10). When solving calculation examples, it is useful to ask the students to estimate the present value before doing the calculation, which can help to avoid errors of magnitude after a while.

Example 2:

A bond is expected to pay $200 per year in interest for the next 5 years and $1000 face value at maturity. What is the present value of the bond? What do you think the bond is worth today?

This simple bond valuation exercise lacks the interest rate to be used to calculate the present value of cash flows. Without it, it is not possible to calculate the intrinsic value of this bond, so students need to ask for additional information. In practice, several interest rates can be given (e.g. risk-free rate, Baa bond rate, expected return on equity market), further explanations may open the door to discuss theoretical issues of risk-return tradeoff. Once the present value (intrinsic value) has been calculated, it can be pointed out that the two questions asked above do not quite cover the same thing. While the first one asks for the magnitude of the intrinsic value, the second refers to the market value. The market value is equal to the intrinsic value only if the assets are correctly priced (if several conditions are met), otherwise they may be under- or over-priced.

2,2 One sentence case studies – "One liners"

General description: This exercise is an open case study which students prepare themselves, choosing from many alternative scenarios, and present a solution to the alternative. The instructor's role is to provide the students with support, facts and figures, if requested or needed.

The aim is to enable the student to find, formulate and structure a problem, to identify different possible solutions and their circumstances, and finally to develop and present a solution to the structured problem.

Example 3:

"Finally, after a long lasting year, my father has decided to increase my monthly allowance by 20%."

The majority of students live separately from their parents and support themselves on their monthly pocket money, and so the sentence was easy to understand in this specific situation. Along with my students of Finances[iv] we took the following path to solve this one liner: it took about 60 minutes to fully unravel the problem, during which time several alternatives and points of view emerged. During the discussion and brainstorming, the question of inflation came up, and since this question was related to a specific situation, the students looked for the Hungarian inflation rate. The change in the price of the average consumer basket brought up the question of how the consumer basket for university students might differ. In small groups, the possible elements of a student's consumer basket and the weights of the elements were determined, and then the whole class jointly produced a compromise consumer basket. The prices of each consumption product or service were found on the Hungarian Office of Statistics (www.ksh.hu) website as it was found to be the most trusted source of information. At the end, we calculated the annual student consumption price index in an MS Excel file and showed that a 20% increase of monthly parent contribution, in fact, reduces the real value of the pocket money. We completed an argument as a response to the original sentence.

The one-sentence case study could address the following questions and learning tasks:

- What is the problem? How can it be structured?
- What data do we need?

- What is the source, how to get information?
- What are the possible solutions? How can solutions/alternatives be presented? Arguments, arguments pro or con.
- Possibility of individual, group and whole-class problem solving and processing.

2.3 Video presentations and competitions
General description: students are to make a video presentation on a topic of their choice. During the presentation, the student will appear during the presentation without using MS Powerpoint. No presentation application can be used, but multimedia elements could be used if they help the transfer of information and understanding. The videos will be evaluated by the students themselves in addition to the instructor, and the video with the most votes will receive extra marks in the mid-term evaluation.

The aim is to enable the student to find a relevant and topical problem related to the subject and to develop their personal presentation and persuasion skills, possibly showing their creative approach.

In my class[v] the students usually formulated the problem in the form of a question, to which they had to provide an answer or solution. The 5 minute limit had to be respected. The video was uploaded in private mode on youtube.com. The video was usually recorded using a phone or laptop. The task was to give a well-structured and professionally correct answer to the question. The evaluation was positive if the presentation was not a read-out or if they added humorous and witty additions to the presentation. Students had access to the videos in an MS Excel file, could vote and had the opportunity to comment on the three videos they thought were the best.

2.4 Economic and financial experiments, games
General description: simulating economic or financial situations with the participation of students online or offline, and with the outcomes from the result of real and present decisions made by the participated students.

Aim: to allow the student to experience the process of economic or financial decision making, to learn about and experience the situation (e.g. market), to compare it with relevant theory, to examine the change in decisions when the circumstances and conditions are changed, and possible to gather and to analyze empirical data.

Example 4:
Choose an integer between 0 and 100. Choose by trying to hit 2/3 of the average of the guesses in the room.
Example 4 is a game theory experiment of the so-called Beauty Contest Game. This game demonstrates that the Nash equilibrium is a powerful concept to show how markets work, but in reality markets may not reach its equilibrium, as some actors play irrationally and do not include all available information for their decisions. The game provides important insights to the market behavior while showing the number of steps the participants think ahead. This game simulates (to use John Maynard Keynes' analogy) stock market expectations and stock choices. During the game, the instructor also make a guess, illustrating that it is possible to predict with a fairly good probability what the outcome of individual anonymous decisions might result. The game is repeatable and can be analyzed as any parameter changes. The average of the guesses of undergraduate students is 2/3, i.e. the winning guess varies between 25 and 30, depending on the time given to think and the mathematical literacy of the students (Komáromi 2014). Holt (2007) gives comprehensive insights and more examples in the field of economics and finance.

3. Conclusions
AI generates fundamental changes in the teaching and learning processes in universities. All dimensions of education are affected, curricula at all educational levels must be reviewed, adjusted as effects of AI become more perceivable (Su et al, 2023). A small but important slice of the issues to be resolved is the type of tasks to be given to students to achieve the teaching and learning goals in the changed environment.

The 4C model of learning identifies the four skills (critical thinking, communication, collaboration, creativity) that determine an individual's success in the 21st century marketplace and society (National Education Association 2023). And while these skills are ideally learned in primary and secondary education, I believe that higher education also needs to nurture these skills in the performance of academic tasks. However, the skills traditionally developed in teaching and learning (reading, writing and mathematics) cannot be relegated to the back burner, and the 4Cs can only come to the fore once the previous skills have been mastered to the extent necessary.

In the age of ChatGPT, 4C skills are particularly valued and must be considered when designing student assignments. The learning process can be more effective if students use as many of these skills as possible when solving their tasks. The four types of tasks presented are not new, but in my opinion and experience, their use can be more successful in the delivery of the subject matter in the field taught at the university. Examples used in financial education can illustrate that:
- information problem tasks develop critical thinking,

- one-sentence case studies develop creative thinking, communication, and collaboration skills,
- video presentations and competitions develop communication skills and critical thinking,
- classroom experiments in economics and finance also require critical thinking and appropriate communication.

This paper argued that assignments and tasks for university students need to be reconsidered and re-shaped in the age of AI. The 4C model can be used in further research on designing assignments as a focal point to find possible ways to increase the efficiency of tasks and assignments given to university students. Other very closely related aspects must be examined such as assessments of students' performance and learning outcomes.

We must also bear in mind that at the end of the day, the effectiveness of education will be measured by the labor market. At this point of time, however, there is much uncertainty about how labor markets look like in 5 or 10 years from now. But developing critical thinking, communication, collaboration, creativity skills of students at university is surely a valuable teaching strategy.

References

Charlotte University (2023): Classroom strategies to promote responsible use of A.I. The Centre for Teaching and Learning, Charlotte University, https://teaching.charlotte.edu/teaching-support/ teaching-guides/general-principles-teaching-age-ai downloaded 10/05/2023

Farina, M., & Lavazza, A. (2023). ChatGPT in society: emerging issues. Frontiers in Artificial Intelligence, 6, 1130913.

Geerling, W.; Mateer, G. D.; Wooten, J.; Damodaran, N. (2023): ChatGPT has Mastered the Principles of Economics: Now What? http://dx.doi.org/10.2139/ssrn.4356034,

Georgetown University (2023): Designing Exams & Assignments with AI in Mind. https://cndls.georgetown.edu/ai-composition-tools/designing-exams-assignments-with-ai-in-mind/ downloaded 10/05/2023

Holt, C. A. (2007). Markets, games, & strategic behavior. Boston: Pearson Addison Wesley.

Kasneci, E. et al. (2023): ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences. Vol. 103. April 2023 forthcoming. https://doi.org/10.1016/j.lindif.2023.102274

Kivunja, C. (2014). Innovative pedagogies in higher education to become effective teachers of 21st century skills: Unpacking the learning and innovations skills domain of the new learning paradigm. International Journal of Higher Education, 3(4), 37-48.

Komáromi Gy. (2023): A first look on the possible impacts of ChatGPT on University Education. In: Horváth B., Földi P. (szerk.): Doktoranduszok Országos Szövetsége Közgazdaságtudományi osztályának IX. Téli Konferenciája. Budapest, Óbudai Egyetem. (2023) under publication

Komáromi Gy. (2014): Using Experiments in Corporate Finance Courses. In: Adrian Knápkova, Eva Vejmelkova & Lukas Danko (eds.) Proceedings of the 1st International Conference on Finance and Economics, 2014 (ICFE 2014). Zlin: Tomas Bata University, pp 306-314 (2014)

Lee College Library (2023): Academic Honesty & ChatGPT : Assignments to Prevent the Use of ChatGPT. https://lee.libguides.com/c.php?g=1296980&p=9527044 downloaded 10/05/2023

Lindsay K. (2023): ChatGPT and the Future of University Assessment. January 16, 2023. https://katelindsayblogs.com/2023/01/16/ChatGPT-and-the-future-of-university-assessment/ downloaded 10/05/2023

Mollick, E. R.; Mollick, L. (2022). New Modes of Learning Enabled by AI Chatbots: Three Methods and Assignments. Available at SSRN.

National Education Association. (2012). Preparing 21st century students for a global society: An educator's guide to" the four Cs." Washington, DC.

Rudolph, J.; Tan, Sa.; Tan, Sh. (2023): ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? Journal of Applied Learning & Teaching, Vol. 6. No. 1. pp.1-22. https://doi.org/10.37074/jalt.2023.6.1.9

Su, J., Zhong, Y., & Ng, D. T. K. (2022). A meta-review of literature on educational approaches for teaching AI at the K-12 levels in the Asia-Pacific region. Computers and Education: Artificial Intelligence, 100065.

Zhang, B. (2023): Preparing Educators and Students for ChatGPT and AI Technology in Higher Education: Benefits, Limitations, Strategies, and Implications of ChatGPT & AI Technologies. Research paper at www.researchgate.net DOI:10.13140/RG.2.2.32105.98404,

Notes

---

[i] The earlier version of this paper was presented at the conference of Researchers' Day of Budapest Business School on May 18, 2023.

[ii] as of 30/05/2023, there are 1420 articles disussing AI and higher education encountered at scholar.google.com

[iii] on BA programme with speciality of Finance and Accounting at Budapest Business School, in the 2nd semester, Academic year 2022/23

[iv] same course as mentioned above

[v] same course as mentioned above