

# Activity Design for First-Year Students with Access to AI

Robert Collier

School of Computer Science, Carleton University  
Ottawa, Ontario, Canada

RobertCollier3@cunet.carleton.ca

## ABSTRACT

We have entered a new era of accessible AI and educators should be urged to embrace an opportunity to provide an early introduction to this technology, without abandoning their legitimate concerns about academic misconduct. With this short paper, the author will discuss two stages in the evolution of a "portfolio game" assignment suite for an introductory computer science course that demonstrated techniques to ensure that students learn to work alongside AI-based tools effectively, legitimately, and ethically.

## CCS CONCEPTS

• Social and Professional Topics → Computing Education

## KEYWORDS

ChatGPT, AI in Education, Programming, Teaching

**ACM Reference Format:** Robert Collier. 2025. Activity Design for First-Year Students with Access to AI. *In The 27th Western Canadian Conference on Computing Education (WCCCE '25)*, April 28–29, 2025, Calgary, AB, Canada. 2 pages. <https://doi.org/10.60770/znfj-0613>

## 1 Introduction

It is a reasonable concern in computer science that exclusively supervised assessment can be inauthentic and unrepresentative of what students may face in the future. Unsupervised activities remain an important part of evaluation, but since a significant body of experience is often not required for admission, assignments in first-year are typically small and target fundamental outcomes. This same simplicity results in activities that can often be completed easily by the AI-based tools now available [1]. For large courses especially, there is thus an immediate need for assessments that support introductory student learning with the presence and use of AI-based tools, while still minimizing concerns about plagiarism.

## 2 Assignment Suite Development

This author believes that ensuring students receive an early introduction to AI is critical, both for ensuring that they are fully prepared for their future and for allowing them to take advantage of opportunities yet to present themselves. The assignment suites discussed in this paper originated in 2023 with a fellowship project, and even at that time it was not unreasonable to claim that the era of accessible AI-based tools had arrived [2], with students already

having access to - but no training in – many free tools. One aim of the project was thus to provide an early introduction to these tools.

### 2.1 Initial Project Iteration (Fall 2023)

The first-year student was the target of the fellowship project, because this student has entered a new discipline with many topics to learn and few reasons not to exploit a free tool to circumvent challenges they encounter. Thus, the key tenets of the project were to teach the fundamentals, provide an "entry-point" to the discourse saturating the media, and introduce the idea of being an effective user of these tools. The course would then be free to demonstrate how AI can be used to solve problems and improve productivity.

The course was designed such that it would not employ any AI for the first several weeks, and students are taught that the individual who simply "tosses" a request to an AI and then copy-pastes the result without analysis or reflection is not making themselves integral to the process. Thus, the initial activities were redesigned to emphasize "scaffolding" (i.e., rough work) and techniques were employed to make the assignments somewhat "AI-resistant". Although the notion of AI-resistance may be in its infancy, specifications were delivered using diagrams (currently more difficult to communicate to the tools available) and with specific library constraints (i.e., requirements to employ libraries that are procedurally-generated on an individual basis for the current offering and are thus "unknown" to any AI-based tools). Further procedural generation techniques add variation to the pool of activities assigned, but it should be emphasized that this was originally introduced here to combat student-to-student plagiarism.

By the middle of the course, pair programming techniques were introduced and practiced, explicitly so that students could begin to view an AI-based tool as a rudimentary assistant, requiring the guidance and oversight of a "navigator". Following introductions to synthetic text generation and some of the mathematics behind neural networks, students were provided an introduction to prompt engineering and a review of tasks selected to illustrate the strengths and weaknesses of these tools (from a developer's perspective).

**2.1.1 Student Reception and Analysis.** Although the options for quantitative analysis were limited by the lack of a "control" section, a review of average grades revealed nothing anomalous, and an anonymous survey was used to gather reactions. Several students commented about their enjoyment of the introduction:

"...AI learning (like ChatGPT) was fun and interesting..."

...but the student reactions to the use of procedurally generated assignments were mixed:

"...in depth w/o being too 'deep' for a beginner course..."

"...not the biggest fan of procedurally-generated assignments..."

Additionally, there was a recurring criticism about the lack of clarity in the assignment specifications:

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WCCCE '25, April 28–29, 2025, Calgary, AB

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<https://doi.org/10.60770/znfj-0613>

*"...assignment details are vague or open to interpretation..."*

This led the author to suspect that efforts made to impede illicit AI use might inadvertently impede comprehension as well. This in turn motivated the next stage in the evolution of the project – a suite of six assignments that can be assembled into a "portfolio game" that students can use to showcase the skills they have developed.

## 2.2 Current Project Iteration (Winter 2025)

It was believed that shifting away from disparate assignments towards a concrete task might address some of the concerns. Thus, with inspiration from the classic educational game "The Oregon Trail", the portfolio game project was introduced. Since this game can be easily experienced by students (by playing it), their introduction can be supplemented with a complete picture of how their final product might appear. Furthermore, as the game can be summarized as experiencing the decision-making tasks of a complex journey [3], it was easy to introduce several random variations on this theme (e.g., an "Undersea Voyage" to explore marine biology, an "Ancient Odyssey" for world mythology, etc.).

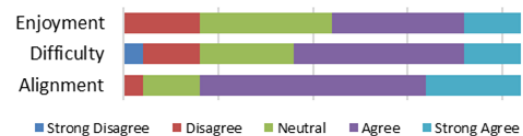
The first assignment tasks students with basic input/output operations (i.e., receiving names, displaying instructions, etc.) and the creation of a title screen using a simplified pygame "wrapper" library. Since the "wrapper" is procedurally generated, it differs from student to student and is not easily communicated to tools like ChatGPT, essentially "forcing" students to read documentation. "Scaffolding" design activities are also included early on, with an arithmetic pipeline (i.e., initial supplies purchase) and branching structures (i.e., choice of character class, etc.) covered in the second assignment. Input validation and counter-controlled loops are introduced to meet the outcomes of the third assignment, and further updates to the graphics library "wrapper" are included so that a "game loop" depiction of the journey (that can be interrupted to access an action menu) is then possible. The fourth assignment requires refactoring to support an introduction to procedural design and, like many of the tasks described previously, specific details (e.g., into what function signatures to refactor) are procedurally generated and vary with each student. Data structures are the focus of the fifth assignment (with an emphasis on string processing in their "random event" system), and by the sixth and final assignment, students are using ChatGPT for code and content generation. To clarify, the final assignment tasks students to have ChatGPT generate textual descriptions for the landmarks visited, as well as snippets of code that provide "minigame" activities to replenish resources. The use of ChatGPT for this assignment is mandatory, with students required to submit transcripts of their "conversations" for evaluation. Thus, upon completion of the suite, students have progressed through the fundamentals to the eventual integration of AI as part of a practical and reflective process.

**2.2.1 Student Reception and Analysis.** At the time of authoring this short paper, the winter semester of 2025 is ongoing, but an unsolicited email received in the fifth week included some exceptionally positive feedback:

*"...the satisfaction each week of submitting something that actually works...is really satisfying. It gives me that extra 'oomph' each week of something I can be proud of to keep me going..."*

This prompted the author to conduct a mid-semester evaluation, with an emphasis on the assignment suite. Of the 31 participants, 21 reported a "better-than-neutral" response (on a five-point Likert scale) for their enjoyment of the course so far. Please note that the current cohort is 90.4% non-CS students (historically having a lower level of enjoyment overall).

To establish specifically the reactions of those students that *are* enjoying the course, of those 21 students, the responses to the statements "I have enjoyed the assignments so far", "the assignments are of an appropriate level of difficulty", and "the assignments are well-aligned with the lectures and demonstrations", had median values 3 (neutral), 4 (agree), and 4 (agree), respectively, and are summarized in Figure 1, below.



**Figure 1: Likert scale results for students enjoying the course.**

The author recognizes that further investigation is warranted (especially into the reactions of those students that did not enjoy the course overall) and is awaiting more detailed feedback, to be received after the current semester has concluded.

Since many techniques were introduced to reduce the amount of unauthorized AI-based tool use, it should also be reported that 10 of the 31 survey participants admitted to the use of ChatGPT in some form (even though we have not yet reached the point in the semester where such use is authorized). This has, regrettably, increased over the results reported after the Fall 2023 semester, where only 9.4% of participants admitted to illicit AI use. The author intends to address this with the next iteration of this activity.

## 3 Conclusion

The work (and need) to integrate AI-based tool use into the computer science curriculum is ongoing. Nevertheless, the author believes that an emphasis on scaffolding and procedurally generated constraints (like "wrapper" libraries), combined with a concrete and satisfying "target" project, can be used to effectively assess students receiving an introduction to computer science, without resorting to exclusively supervised assessment techniques.

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