Generative AI as Scaffold or Substitute: Cognitive Responsibility in Digital Media Art Education

Can Zheng*
School of Fine Arts and Media, Jiangsu Second Normal University, Nanjing 210013, China
*Corresponding email: canzheng1228@jssnu.edu.cn

Abstract

Generative artificial intelligence (AI) has the potential to expand the visual toolkit available to students in digital media art. However, a visually attractive AI-generated output does not, in itself, demonstrate that students have developed the ability to make design decisions. This paper proposes a theoretical model that identifies when AI functions as a cognitive scaffold and when it functions as a substitute for the work that students should be doing. The model is based on who is responsible for problem framing, the generation of options, the evaluation of those options, and subsequent design revision. AI literacy enables students to interrogate AI outputs, while task design can be used to make these responsibilities significant. Four propositions link responsibility allocation to creative development, critical evaluation, literacy, and assessment. Two tables are provided that offer a means of operationalising the framework in terms of observable task characteristics and potential research designs. The argument is not that working independently is the best option in all cases, or that the use of AI in any form necessarily reduces creativity. Rather, the argument is that the pedagogical value of AI depends on whether it provides students with genuine opportunities to exercise and develop their judgement. The propositions require empirical testing in the context of digital media art education.

Keywords

Generative artificial intelligence, Digital media art education, Artificial intelligence literacy, Cognitive responsibility

Introduction

Generative AI enables students to generate images, text and other design outputs from extremely short prompts. In the context of digital media art education, this is not simply a matter of an increased rate of production. It is a change in the nature of the options available to the student against which their subsequent creative decisions will be made. A high-quality image may be the result of a long period of exploration, or it may simply be accepted by the student without their having fully defined the problem that the image is meant to solve. The quality of the final product therefore tells us very little about the learning that has occurred.

Research in higher education has established both the potential of generative AI for brainstorming and as a learning support tool, and the concerns around accuracy and personal development [1,2]. Design research has also demonstrated that AI can be considered in terms of the particular task rather than as a single tool [3]. The educational value of AI assistance is a function of how the task is broken down, not simply of how often or whether the AI is used. This paper makes that distinction in the context of digital media art education, where the generation of visual possibilities, the selection of those possibilities and the articulation of the aesthetic and communicative reasons for that selection are all integral to the learning process.

The argument is entirely theoretical. The mechanisms are drawn from the evidence base in general higher education, design, writing and architecture, and do not establish their efficacy in the context of digital media art students. The paper's contribution is a framework which distinguishes support for student judgement from the displacement of the opportunity to exercise that judgement, and which links that distinction to task

design and assessment.

Cognitive responsibility across the design process

Cognitive responsibility is the student being actively involved in the process of defining the design problem, the generation (or direction of) the range of options, the assessment of the options for appropriateness and then the modification of the proposal. It is not the same as doing everything by hand. A student can offload the actual image generation and still be cognitively responsible for the definition of the constraints, the judgement of the outputs against those constraints and the decision as to what to change. Conversely, typing a prompt and then simply selecting the most visually appealing result may be a process in which the student has not in any way actually been involved in any of the key decisions.

A scaffold provides the resources which allow the student to make a decision which is still educationally meaningful to them. A substitute is one which either performs or pre-empts the target decision in such a way that the opportunity to make that decision is in fact removed. These are functions of the interaction rather than inherent properties of the tool. The same generated image can be a scaffold to the process of critique when the student is actually engaging in the process of explaining and modifying their compositional choices, or it can be a substitute for composition if it is simply submitted without that level of engagement. It is entirely possible for the assistance to remove a rote activity without in any way displacing the learning outcome. The instructor therefore has to be very clear about the capability they are looking to develop before they can decide whether or not a substitute has been used.

The distinction is process specific rather than a general one for the project as a whole. AI could be used in the initial exploration phase with the student having complete control over the evaluation, or it could provide a very strong initial idea which in turn would constrain the range of options available in the later stages (despite a lot of editing). In a study of short story writing, AI-generated ideas led to better individual evaluations, but the stories themselves were more similar to each other [4]. That is a writing domain result rather than one in visual arts education, and it does nonetheless serve to underline the need to consider the quality of the individual product and the diversity of the creative pathways as separate outcomes. Work on creative partnerships sees the human-AI interaction as a relationship which is in development rather than a simple choice between independent and automated production [5]. In the context of game design, practitioners have reported both the benefits of AI in terms of idea generation and the potential for creative dependence [6]. Those are the views of the practitioners, and they inform the argument here in no way constituting an effect on student learning. Table 1 details the allocation of responsibility at each stage.

Table 1. Cognitive responsibility and the educational function of generative AI.

Design stage	Scaffold function	Substitution risk	Observable student responsibility
Problem framing	Suggests questions or stakeholder perspectives	A generated brief replaces the student's interpretation	States audience, purpose, and constraints; explains their relevance
Idea generation	Supplies contrasts that extend a student-directed search	The first generated concept becomes the unquestioned direction	Develops or requests alternatives using a stated rationale
Evaluation	Provides examples for comparison and critique	Visual appeal replaces criteria-based judgment	Compares alternatives against explicit communicative and aesthetic criteria
Revision	Offers adjustable drafts or technical possibilities	Changes are accepted without assessing their consequences	Explains and tests revisions against the design problem

The table sets out the analytical possibilities rather than mutually exclusive observed categories. A student's explanation may be partial or post-hoc; you need to look at the process traces and ask follow-up questions to establish whether the reasoning actually did lead to the decision.

Four propositions

Assistance and creative development

The value of producing a large number of options is in what the students do with them. If they use the outputs to compare compositional approaches, to identify any unintended meanings and then to refine the brief, the AI has provided a useful quantity of material for them to work with intentionally. Both the research into task-based design frameworks and the field evaluation of an AI-supported design system place design activity in a very appropriate context in which to look at such support [7]. Neither of those studies, however, goes on to establish that the mechanism in question works in every digital media art classroom.

If the generation provides the concept, the selection criterion and the final visual structure, then the student can proceed to complete the project without having to engage with the actual decisions that went into it at all. The significance of this is particularly acute when the decision in question is the very one that is the learning objective. It is a much less significant issue when the decision in question is simply a peripheral one in the production process. A very able student will still be able to learn from a close analysis of an AI-generated proposal, whereas the less able student may find themselves requiring a great deal of prompting and examples in order to get started.

Proposition 1: Where generative AI offers alternatives and the student is left with the responsibility of framing, comparing and then revising those alternatives, the use of AI is more likely to be of benefit in terms of the development of creative judgement than where the AI-generated options simply replace the student's own.

Judgment, verification, and output quality

Digital media artefacts communicate through composition, visual convention, audience and context. An output may appear to make sense but in reality, it may be distorting the reference, concealing the message or simply reproducing an inappropriate convention. The evaluation of such outputs therefore needs the student to have established their own criteria before or as part of the comparison, to be able to consult the source material where appropriate and to be able to explain the connection between the visual choices and the intended audience. A pedagogical framework for visual communication would similarly link AI-assisted assessment to conceptual depth, aesthetic quality and process transparency [8]. This is a proposed mechanism rather than a claim that AI outputs are in fact wrong or consistent.

Studies of students' perceptions in higher education and in information and communications technology (ICT) education have shown that students see the value in generative AI and also recognise the need to address issues of accuracy and guidance [9]. These are findings about students' perceptions rather than any actual gains in learning in the area of digital media art. The framework goes on to take these issues further and applies them to visual and communicative judgement.

Proposition 2: The AI-assisted design learning relationship is improved when students are assessing the outputs against explicit, task-relevant criteria and checking the validity of the claims that emerge as a result of the output rather than simply picking the one that looks best.

AI literacy as an enabling condition

AI literacy is about understanding AI and using, assessing and creating with it, as well as having an awareness of the ethical implications [10]. For digital media art, this would mean knowing that generated content is just a proposal and not in itself evidence; knowing how to set constraints; being able to compare outputs; and being able to ask the right questions about authorship, privacy and rights. Tool-specific prompting is just one aspect of that competence.

Literacy is not simply a matter of having access to an interface. A study with secondary school students reported gains in Al knowledge and in affective and cognitive engagement, but the design did not establish that these gains extended to higher-order evaluation and creation [11]. The students and the instructional context are very different from those of university art education, so the result is not in any way a direct measure of what would happen in that environment. It does, however, serve to explain why you would not expect awareness and higher-order evaluation to develop in parallel. The students' own levels of awareness and their own perceptions are in line with this and further highlight the

importance of context in determining how students view their own work [12].

Proposition 3: Greater task-relevant AI literacy is likely to enhance the connection between AI-supported exploration and the quality of student evaluation and revision (i.e. the extent to which students are able to evaluate and revise their work) as long as the task gives students the opportunity to use that literacy.

Task design and assessment

Literacy alone will not foster responsibility if the only criterion for reward is the speed at which one can produce a polished final product. Conversely, demanding exhaustive documentation for every step of the process will consume the very time that would otherwise be available for creation and experimentation. Consequently, the classroom encounters the challenge of selective assessment. The teacher must determine which decisions are genuinely significant to the learning outcome and for which evidence is necessary. It is not essential to document every single decision; rather, evidence is required only for those that are consequential. Earlier work on artificial intelligence in higher education already pointed to the continued importance of the pedagogical role when new technologies are introduced [13]. In the model described, the teacher sets the parameters of the task, provides feedback on the rationale and the revisions, and then decides which of the operations can be handed over to the AI. A visual campaign assignment would be a case in point, with the student producing AI-generated drafts, two versions (one in the context of the audience) and a final version which is then refined with a short justification. A formative critique could be run prior to the final piece being refined so that the process of reasoning is made visible and still has an impact on the design. A law course case study is cited as an example of how generative AI could be embedded into an assessment with a requirement for reflection, though of course the context and outcomes of that study would not necessarily be transferable to a visual design context [14].

Proposition 4: Task design and assessment criteria which make students' own framing, comparison and revision of their work genuinely significant are more likely to promote cognitive responsibility during AI-assisted work than those which simply assess the final artefact.

Implications and empirical examination

The four propositions distinguish a pedagogical question from a tool adoption question. The key issue is not whether or not a course permits generative AI, but rather what decisions are being asked of the students, how the AI is being used in those decisions and what constitutes evidence that the required skill has in fact been acquired. A task which permits huge amounts of AI use can still be a pedagogical task which requires independent judgement; a nominally AI-free task can also fail to elicit such judgement if it rewards imitation alone.

Table 2 lists various ways of looking at the propositions (without necessarily presenting the proposed relationships as established findings). The measures should be able to distinguish between process quality and artefact quality and should include a follow-up task with restricted AI access if the aim is to look at transfer. The transfer task should be one that is relevant to the learning objective in question rather than a generic test of creativity.

The framework also suggests that cognitive responsibility should be assessed in terms of the pattern of decisions made rather than simply as a function of how much AI the student has used. Two students could produce very similar end results (e.g. very similar images), but the quality of their problem framing, the range of alternatives they considered, and the reasons they gave for rejecting or modifying an output could be very different. For that reason the assessment should maintain a link between the student's stated intention and the actual changes that they make. A brief design rationale can capture the audience, the communicative purpose, the criteria and the key changes without the need for a full transcript of all the prompts. The value of the rationale is in its connection to the significant decisions that were made, not in the amount of text.

This distinction is also relevant when it comes to efficiency. Faster production is only educationally valuable if the time saved can be redeployed to the actual work of comparison, experimentation, critique and refinement. If the time saved merely enables an unexamined product to be delivered earlier, then the efficiency may in fact be masking a reduction in learning.

Future work could therefore look at both the time taken to produce and the way that time was distributed between framing, exploration, evaluation, and revision. It could also look at the students' explanations in the light of the actual sequence of alternatives and changes that occurred in the design process. That would go some way to separating out genuine judgement from post hoc justification. A process-sensitive approach does not mean that students have to turn down the use of AI at all, it simply means that the assessment has to show where the use of AI stops and where student judgement remains (see Table 2).

Table 2. Propositions and possible empirical examination.

Proposition	Design contrast or condition	Process evidence	Outcome and interpretation
1	Student-directed exploration versus AI-supplied choices, with comparable task goals	Briefs, alternatives, and decision logs	Compare judgment and transfer; separate from final polish
2	Explicit criteria and verification versus unstructured selection	Comparison notes, source checks, critique	Assess relevance of choices and reasons, not preference alone
3	Variation in task-relevant AI literacy under comparable opportunities	Literacy assessment and observed evaluation	Test whether literacy changes the exploration–revision association
4	Process-sensitive assessment versus final-product-only assessment	Framing, feedback response, revision history	Compare responsibility and learning while accounting for workload

A good future design would be to compare classes or randomly assigned task conditions where possible, using a common brief, a set of scoring rubrics and blind assessment of the outputs. Baseline design experience, prior familiarity with AI, access to tools and the amount of instructional support would all need to be measured or balanced. Process logs would be collected with consent and appropriate privacy safeguards in place. It would be important to consider whether the documentation that was required actually resulted in improved learning or merely led to greater compliance, and whether the effect varied as a function of the students' prior level of expertise and the complexity of the design problem. Correlational evidence on its own would not be sufficient to demonstrate that a particular allocation of responsibility leads to learning gains.

Conclusion

Generative AI in itself is not a scaffold, and it in itself is not a substitute for learning. Its place in education is a function of the operations that are being delegated and the judgements that the learner is expected to make. The framework being proposed is one in which cognitive responsibility sits at the core of that relationship. The learner learns through the opportunity to frame, to compare, to judge and to revise, and the AI can be the provider of the material and the provider of the feedback for those activities. AI literacy is the enabler of critical use, and it is the nature of the task that will determine whether that capability is actually exercised and can be evidenced in assessment. The propositions that emerge form the basis for testing the design of digital media art education that values both the creative output and the development of judgement.

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Conflicts of Interest

The author declares no conflict of interest.

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