On the Role of Reflection and Digital Tool Design for Creative Practitioners

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ABSTRACT

This position paper suggests that Creativity Support Tools (CSTs) could be designed for reflection to foster self-learning in creative user experiences. The authors suggest that a state where people continually apply reflection and *conscious* processing is likely conducive to supporting creative practitioners use of and self-learning of digital tools. This contrasts theories that encourage passive interaction which forgoes self-awareness cf. flow theory. To this end, two case studies from the first author's PhD research are introduced: i) a questionnaire to differentiate between creative user experiences with more or less moments of reflection, and ii) a summary of the iterative design of a block-based CST to encourage moments of reflection in people's generative music composition with AI. This research is then discussed in the context of the workshop themes.

CCS CONCEPTS

• **Applied computing** → **Arts and humanities**; • **Human-centered computing** → *Empirical studies in HCI*; **HCI design and evaluation methods**; *User studies.*

KEYWORDS

creative process, creativity, creativity support tools, reflection, reflective practice

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1 RESEARCH INTERESTS

We are interested in the role of reflection in creative user experiences. Specifically, we question the idea of the creative genius who produces work without effort through unconscious processing – the prodigy able to create masterful art by spontaneously acting upon flashes of inspiration [1] at a whim whilst being fully absorbed in their creative process, loosing track of time and their own self-consciousness [4]. Instead of passive interactions where self-awareness is avoided, we suggest that an alternative approach might better support creatives in becoming competent and confident digital learners. The *cognition-in-action* principle [12] suggests that experts are at their optimal performance when they are *consciously* reflecting and applying mental processes. Introduced by Montero [12], the principle suggests that reflection is fundamental to self-learning, improvement and the growth required to achieve an optimal state of performance. Indeed, this concept was introduced to the domain of creativity support by Candy [3], whilst warning that Montero's [12] research is largely based on goal-oriented activities such as sports, yet might also apply in creative contexts.

Montero's [12] principle contrasts the notion that optimal performance in creative settings occurs in a flow state [4] where self-consciousness and awareness is to be avoided. The experience of creative geniuses was investigated by Csikszentmihalyi [4] who developed the theory of flow – where people experience an optimal flow state whilst at their happiest and self-actualised, with feelings of control and a loss of self-consciousness. The theory of flow was influential in seminal research on Creativity Support Tools (CSTs) [9, 14]. It was assumed that, if CSTs could nurture a similar user experience to the experiences of creative geniuses, perhaps our digital tools could also better foster people's creativity.

The position of the authors is that a view closer to that of Montero [12] might be useful in designing CSTs, contrasting key aspects of Csikzentmihalyi's [4] theory of flow. Perhaps, this has implications for the design of various CSTs and the types of skills they should nurture. By taking part in the workshop, the authors hope to introduce their framework for exploring reflection in creative experiences [6] and foster connections to strengthen its design. We hope to connect with a community of researchers to discuss and consider how reflection is characterised in different creative contexts beyond those that we considered, and how this could be used to inform the design of digital tools to support people's self-learning across various creative practices. We bring forward case studies and perspectives from the first authors ongoing PhD research which includes i) the development of a lightweight self-report questionnaire to differentiate between creative user experiences which exhibit more or less moments of reflection, and ii) observations from user studies on CSTs for encouraging reflection in a co-creative process between humans and generative AI in music composition.

2 CASE STUDIES

Below two case studies from the first author's PhD research are introduced.

2.1 Case Study 1: The Reflection in Creative Experience Questionnaire

In a paper to be presented at the CHI conference this year [6], a lightweight self-report questionnaire which can differentiate between creative experiences which exhibit more or less moments of reflection was developed, named RiCE (Reflection in Creative Experience). It was developed through i) a review of questionnaire items by 10 experts in creativity (with some knowledge of HCI) and ii) an exploratory factor analysis of the reviewed items. Key

findings were that items indicating a cyclical process of improvement in creative work might indicate moments of reflection. For example, the experts noted that "you can reflect on each interaction to understand why each may not have worked" or that they are "constantly learning and refining techniques" when being creative. Worrying about other's perceptions also didn't seem important to the experts – perhaps, decisions in creative activities are personal to creators. Overall, the factors drawn from the exploratory factor analysis – where 300 participants were recruited through Prolific (https://www.prolific.co/) each considering different CSTs – are listed below, with the questionnaire items (statements to rated on an ordinal scale) for each factor in italics.

Reflection on Current Process. Did people reflect on how they already make their art?

- *Cp1 – Whilst being creative, I liked to think about my actions to find alternative ways of doing them.*
- *Cp2 – I often re-examined things I'd already learnt.*

Reflection on Self. Did people reflect on themselves whilst being creative?

- *Se1 – I learned many new things about myself during the experience.*
- *Se2 – I pondered over the meaning of what I was doing in relation to my personal experiences.*

Reflection on Past Experiences. Did people look back on their previous creative experiences?

- *Pa1 – I explored my past experiences as a way of understanding new ideas.*
- *Pa2 – Whilst creating, I thought back on some of my past experiences.*

Reflection through Experimentation. Did people experiment with their materials whilst using a CST?

- *Ex1 – I made comparisons within the system to consider alternative ways of doing things.*
- *Ex2 – I often generated, tested and revised ideas.*

It is not possible to confirm the validity of RiCE as of yet. However, we suggest that the factors above are interpretable in a conceptually meaningful way. Attendees of this workshop might find the questionnaire directly helpful as a way to assess the amount of reflection people experience when using their digital tools, or view the factors as a useful framework for considering the different types of reflection that can occur across various creative experiences. There would be an opportunity at the workshop to make connections and foster collaborations to test the next iteration of RiCE across a wide context of creative practices, towards securing its validity.

2.2 Case Study 2: Applying Generative AI in a Musical CST to Encourage Reflection

To explore reflection in creative experiences, the first author is currently exploring how people use generative AI applied in a CST for music composition as a case study. It builds upon their earlier work [5, 7, 8] using block-based programming in the context of music composition to support children's self-learning, exploration and tinkering. Recently, a CST for digital music composition with generative AI was developed across 12 iterations to identify ways to encourage reflection, using blocks which hold fragments of music. In each iteration, the interface was critiqued by Data Science students (masters), AI & Music students (PhD), or Design Innovation students (final-year undergrad). The sessions focused on designing ways that reflection could be encouraged or discouraged in the co-creative composition process with AI. Some key ideas emerging from these design sessions were are as follows: i) allowing users to play back parts of the music at different levels, e.g. an individual block, a row of blocks or all blocks at once, might afford different types of reflection; ii) an AI generating good quality music might have actually decreased moments of reflection because users were happy to incorporate music they assumed sounded good without reflecting; and iii) animating AI suggestions to fly into the user's workspace might have also decreased reflection as users needed to perform less interactions which could have prompted their reflection, simply leaving the AI system to work automatically.

3 CONNECTION TO WORKSHOP THEMES

In the subsections below, the connections between our case studies and the aims of the workshop are discussed.

3.1 Defining and Understanding Skills

In our view, reflection is an essential skill that creative practitioners must develop. To foster digital competency, being able to reflect on actions will be helpful in supporting the learning of new tools – whether they be sensors [11], conversational AI interfaces [13] or CSTs. The experts consulted for RiCE emphasise the importance of reflecting on their actions whilst being creative [6]. The work on musical CSTs have also suggested that allowing people to break down creations into more manageable chunks (e.g. by playing music at different levels) might support certain types of reflection [7]. Similar recommendations are drawn from Wagener et al.'s [15] study of reflection in a creative VR experience – to provide "hands-on" suggestions to encourage reflection foremost, and more high-level prompts later on. In the workshop, it would be interesting to discuss if other creative disciplines place emphasis on different types of reflection and whether similar design patterns might be helpful across creative disciplines.

3.2 Supporting Self-guided Learning

The tools used in the author's research have focused on the open-ended task of composing a piece of music, examining people's self-learning of musical CSTs. For instance, people can be seen to use the play button to listen to their music to evaluate how (unexplained) features work systematically [5, 7]. It'd be interesting to discuss whether aspects of creative tools should be transparent and fully explained to support learning, or ambiguous [10] as to encourage systematic tinkering behaviours and support less formal ways of learning. Is too much explanation detrimental to the open-ended nature of creative learning, particularly within artistic contexts [2]?

3.3 Developing New Tools and Systems

The author's recent work in case study 2 (§2.2) has focused on digital tools to support music composition. In these studies, effort is made to reduce the complexity of the interaction so that the tools are easily understandable and can uncover actionable insights within a research context. Integrating such tools into a larger creative workflow would be interesting to explore. Do the design suggestions identified equally work well when integrated into professional tools? What might be the challenges of integrating such ideas?

3.4 The Role of Physical Spaces

Design studio environments are crucial for many creative practitioners where informal collaborations can enhance their work. It would be interesting to consider if digital tools, such as the AI systems explored in our research, would be able to offer similar support in place of in-person collaboration. For example, could AI systems act similarly to the data scientists, musicians and design students who critiqued prototypes in the iterative design sessions discussed in case study 2 (§2.2)? Even if plausible, might this have negative impacts on artistic collaborations? Would artistic work mirror the design ideas of AI systems? Or, could AI be harnessed to encourage people's reflection, fostering their self-learning?

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