# Exploring the Potential of Generative AI for Constructing Creative Imagery Tailored to Individual Developmental Stages and Regional Cultures:

## Focusing on Pedagogical Design for the Aphantasia Spectrum

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## Definition of Aphatasia and the issue for arts education

Aphantasia, defined by Zeman[1] in 2015, is a lifelong inability to generate mental imagery, with a prevalence of approximately 4%, according to Dance[2] and Takahashi[3]. Nearly 20% of individuals cannot form images when asked to imagine unfamiliar scenes or movements[4]. Bainbridge's study[5] shows that individuals with aphantasia do not lack confidence in their artistic abilities. However, our surveys suggest that these individuals tend to have lower confidence in art and take longer to start drawing after instructions requiring mental imagination[6.7.8]. Graphic designer Amy Light, who has aphantasia, notes that she needs to refer to each line she draws when depicting unfamiliar scenes, taking a lot of time and requiring multiple references[9]. This suggests the potential need for AI support in creating visual images for aphantasia and complex subjects.

## Characteristics of Aphantasia Spectrum and Support through Generative AI

Art education faces significant challenges in addressing the aphantasia spectrum in developmental stages. Cognitive development in children follows a universal process influenced by culture and environment, enriching children's artistic cognitive abilities through diverse cultural experiences[10]. However, it remains unclear how individuals with aphantasia develop artistic cognitive abilities and how they can be supported. Developing image-generating AI that can provide appropriate support by considering cognitive levels at different developmental stages and cultural backgrounds is essential.

Ishiguro's research[11] shows that children gain more inspiration from seeing works created by their peers than those by adults, with this tendency more pronounced in lower grades. Additionally, children are more inspired by abstract art. This indicates that AI must be appropriately customized to ensure children can understand and engage with the generated images.

Our experiment found that generating children's drawings using ChatGPT 4.0's DALL-E faced challenges due to a lack of references from Asian regions. Using LoRA with artwork from the 46th Children's Art Contest by Sumitomo Life Insurance[12] allowed better customization. Future efforts should customize generative models to reflect developmental stages and cultural contexts, and validate them through empirical studies. To this end, we are advancing a project to collect drawings from elementary school students and apply model corrections based on the drawings gathered from each grade level.

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## Bio


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