

# Art, Technology and Participation in Later Life

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## Abstract

Digitalisation is reshaping social participation across all areas of life. Yet older adults, particularly those with cognitive impairments, are frequently excluded from these processes due to structural barriers, inaccessible interfaces, and a lack of inclusive co-creation opportunities. This qualitative study, grounded in design-based research, investigates how the low threshold, web-based drawing tool *ArtEater* can foster digital and creative competencies among older adults. Developed at a German research university receiving national research funding, it was iteratively refined through direct collaboration with participants and tested across three heterogeneous groups of older adults, including individuals living with dementia, leading to new functions, tutorials and the development of creative and digital interests. Emerging findings indicate that low-threshold creative tools can facilitate meaningful digital engagement, even for participants with no prior experience. Some participants began projecting their creative work onto broader social imaginaries, envisioning connections between their drawings and assistive technologies. This points to an underestimated capacity for intergenerational thinking and future orientation among older adults. These results suggest that ageing should not only be framed through vulnerability, but also through agency, imagination, and creative practice. The tool demonstrates that purpose-built inclusive tools can create participatory learning spaces that make digital engagement accessible and meaningful for a diverse older population, contributing to efforts to counteract the digital divide.

*Keywords:* art education, participation, media literacy, design-based research, creativity

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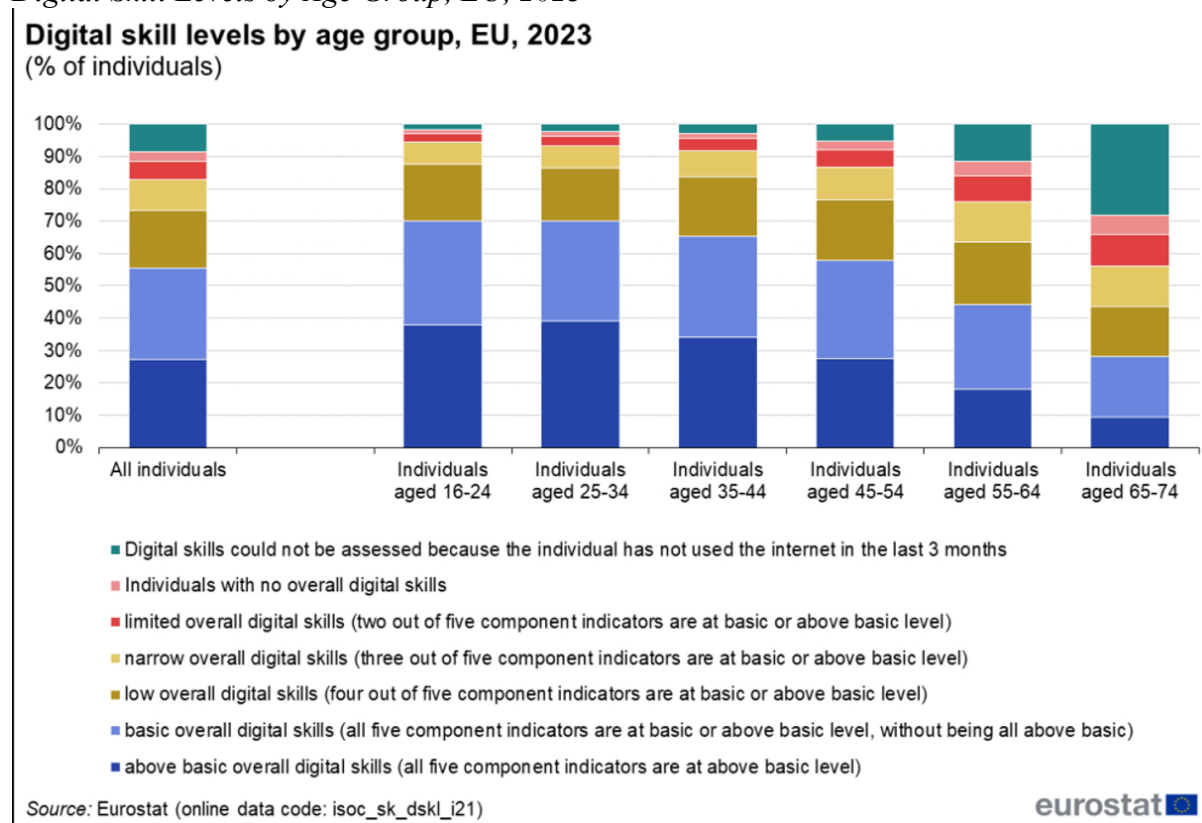
## Introduction

Digitalisation increasingly shapes how people communicate, access information, use public services, participate in cultural life, and maintain social relationships. Digital spaces have therefore become central spaces of participation. However, participation in these spaces cannot be taken for granted. It depends on access to devices and internet connections as well as on the possibility of using digital technologies in understandable, meaningful ways that connect with one's own interests and everyday life. This is particularly relevant for older adults, who are often insufficiently considered in processes of digital development despite the growing significance of digital technologies in later life.

Eurostat data (2023) on digital skill levels in the European Union illustrate the extent of age-related inequalities in this context. Digital competence is assessed across five areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving. This understanding includes the ability to navigate digital environments, communicate and collaborate with others, create content, use technologies safely, and respond independently to digital problems.

**Figure 1**

*Digital Skill Levels by Age Group, EU, 2023*



Source: Eurostat (2023)

As Figure 1 shows, digital skill levels decrease steadily across age groups. Individuals aged 16–24 are predominantly represented in the categories of basic and above-basic overall digital skills. In contrast, the proportion of people with limited, narrow, low, or no overall digital skills increases with age. The difference is especially striking when comparing the two oldest age groups included in the dataset. Among individuals aged 55–64, around 22% show little or no digital skills. Among those aged 65–74, this proportion rises to approximately 42%. At the

same time, around 70% of individuals aged 16–24 demonstrate basic or above-basic digital skills, whereas this applies to only approximately 29% of those aged 65–74.

The data must nevertheless be interpreted with caution. Adults aged 75 and above are not included in the Eurostat data. This is a significant limitation, as this group is particularly relevant to questions of digital participation, care, cognitive impairment, and social inclusion. While the available figures do not permit direct conclusions about very old adults, the pronounced decline among those aged 65–74 indicates that the challenges of digital exclusion may become even more crucial in later stages of life.

The German Initiative D21 (2024) describes this unequal distribution of digital competence as a “Digital Skills Gap.” The gap draws attention to considerable differences within the heterogeneous group of older adults. Digital exclusion is shaped by unequal educational and occupational biographies, different experiences with technology, access to digital infrastructure, changing physical and cognitive conditions, and the design of digital interfaces. Technologies developed without considering the needs, interests, and everyday realities of older users can create additional barriers instead of enabling participation.

The present study investigates how the web-based drawing tool *ArtEater* can support digital participation and creative practice among heterogeneous groups of older adults, including individuals living with dementia. The study approaches digital participation as more than successful technology use. It examines whether digital creative practice can enable participants to develop individual ideas, make aesthetic decisions, articulate interests, and imagine connections between creative practice, technology and everyday life. In this sense, *ArtEater* is examined as a potential participatory creative space in which digital engagement can become personally meaningful, socially relevant and open to individual forms of expression.

## **Literature Review**

### **Digital Competence and Social Participation in Later Life**

The development of digital competence is closely connected to questions of social participation. Eder et al. (2024, p. 7) and Bozdağ (2024, p. 93) argue that people of all age groups, from children to older adults, should be supported in developing reflective digital competences in order to promote participation, empowerment, and visibility. Digital competence can therefore be understood as a prerequisite for acting, communicating, and becoming visible in increasingly digital social environments. Older adults are part of the most vulnerable groups challenged by the digital divide (Hargittai, 2022).

The Council of the European Union (2018, C189/9) similarly emphasises that both the use of digital media and the competent handling of these media are crucial for social integration. This is particularly relevant in a context in which access to information, communication with institutions, participation in cultural life, and contact with family members or peers are increasingly mediated through digital technologies. Digital participation cannot be reduced to device ownership or internet access. It includes the possibility of understanding, using, questioning, and shaping digital environments in meaningful ways.

For older adults in vulnerable situations, limited digital competence may have consequences that extend far beyond the inability to use a particular application or device. Thege et al. (2021, pp. 47–50) warn that a lack of digital literacy can increase the risk of social isolation,

particularly among groups already vulnerable to exclusion. This concern is especially relevant for older adults living with cognitive impairments. Their participation in digital spaces is often restricted by inaccessible interfaces, a lack of suitable support structures, and deficit-oriented assumptions concerning their technological abilities.

Limited experience with digital technologies should not be equated with a lack of interest, imagination, learning capacity, or potential for participation. Older adults represent a highly heterogeneous group, characterised by different biographies, educational experiences, professional backgrounds, health conditions, and relationships to technology. A participation-oriented approach must focus on the experiences, interests, and perspectives of the participants to develop digital environments.

## **Creative Practice and Participatory Design**

Creative practice can provide accessibility to digital participation. Digital drawing allows participants to approach technology through visual experimentation, individual expression, and aesthetic decision-making. Rather than focusing exclusively on predefined operational skills, creative digital environments can support engagement with technology in relation to personal interests, memories and ideas in a less instructive way.

Bubolz-Lutz et al. (2022, pp. 144–145) identify creative and art-oriented programmes as valuable educational interventions, particularly for people living with dementia. Within such approaches, artistic activity can create opportunities to develop and communicate ideas, make aesthetic decisions, engage with visual materials, and participate in collective creative processes. Art-oriented practice may therefore open spaces in which older adults are addressed through their interests, experiences, and creative capacities instead of being viewed solely in relation to care-related needs.

This perspective has implications for the design of digital tools. Mohr (2020) argues that programmes for particular groups should not be determined primarily by technological possibilities or computer-scientific perspectives. Instead, the needs and interests of the respective groups should be in the centre of the design process. Applied to digital technologies for older adults, this means that digital tools also need to offer meaningful possibilities for exploration, participation, creative expression, and the development of individual interests (Tuna & Mohr, 2025).

The development of inclusive digital environments therefore requires more than the subsequent adaptation of completed technologies. It requires participatory processes in which potential users can contribute to the development, testing, and revision of digital tools. Such processes can identify barriers that might otherwise remain unnoticed.

## **Methodology**

### **Research Project and Research Design**

The research project *ArtEater in Live Tests* investigates how a web-based drawing tool can support creative media use and digital participation among younger and older people, including individuals with cognitive impairments. *ArtEater* was developed as an easy-access digital drawing environment that enables users to create, modify, combine, and experiment with visual

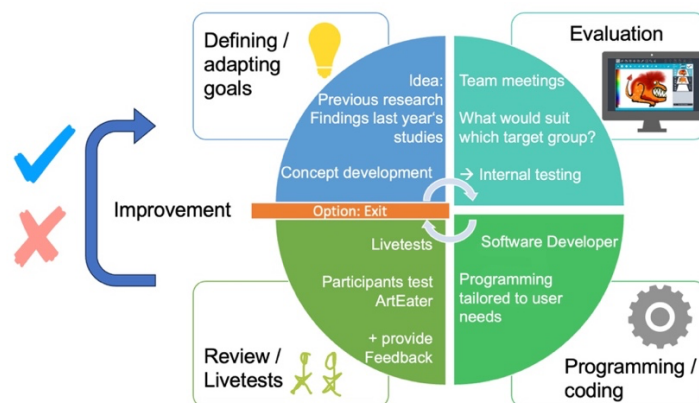
forms without requiring extensive prior knowledge of digital technologies. The project received funding from Germany's Federal Ministry of Research, Technology and Space (Mohr, 2024).

The study followed a participatory and iterative research approach. The participants' experiences, feedback, difficulties, interests, and creative ideas became part of the ongoing development of *ArtEater*. This approach is based on the assumption that digital environments for older adults should not be developed exclusively on the basis of technical possibilities or externally defined assumptions about ageing. The needs and perspectives of current and future users need to become part of the design process itself.

## Iterative Development and Live Tests

**Figure 2**

*Iterative ArtEater Research Cycle*



*Source:* Developed in collaboration with the Museum Barberini in Potsdam, Germany

Figure 2 visualises the iterative procedure developed in collaboration with the Museum Barberini in Potsdam, Germany. The process began with the development of art educational concepts and the definition or adaptation of research goals. For the second research cycle, the thematic framework was *Memories of Summer*. Within this concept, participants engaged with artistic references, including works by Claude Monet, David Hockney, and Georgia O'Keeffe, as sources of visual inspiration. Findings from the first research cycle were considered at this stage in order to identify aspects of the research design, interface, functions, or pedagogical approach that required further development.

The following evaluation phase included online team meetings and internal testing phases. The outcomes were discussed with the software development team. On this basis new functions were programmed and existing functions, layouts, and design elements were adapted to the needs identified during the live tests, a test under real life circumstances. The aim was *ArtEater* to be developed as a flexible environment that could respond to different experiences of ageing, artistic practice and digital competence.

The adapted version of *ArtEater* was subsequently tested in on-site group settings, referred to in the project as "Live Tests." During these sessions, participants used the tool, explored its functions, created creative artefacts, and provided feedback on their experiences. Feedback addressed the usability of the tool and its creative potential. It concerned, for example, the comprehensibility of functions, the accessibility of visual elements, the orientation provided

by the layout, and the extent to which the available tools supported individual artistic experimentation.

The findings were reviewed by the research and development team. Depending on the results, functions, layouts and design elements were modified or removed before the next live test phase would begin a year later. The iterative process therefore connected art educational concept development, internal evaluation, software development, participant feedback and continuous adaptation.

The study comprised two research cycles with older adults. The first cycle was conducted in summer 2024 and influenced the development of the second cycle, which was carried out during summer and autumn 2025. Each cycle consisted of three studies per participant group. Across the two cycles this resulted in six studies for each group and a total of 18 workshop sessions. The iterative structure made it possible to examine how participants used *ArtEater* at different points in the research process and how their experiences and feedback shaped the continuing development of the digital environment.

### **Participants and Group Constellations**

The study was designed with three heterogeneous groups of older adults. This grouping was intended to account for the diversity of older age and to avoid treating older adults as a homogeneous group. The participants were between 60 and 98 years old. In total, 22 older adults took part in the study.

The first group consisted of seven creative older adults. These participants were primarily artists with experience in analogue painting, drawing, or sculpture. The second group comprised nine digitally diverse older adults who had not regularly painted or drawn during the preceding year or, in some cases, for several decades. Participants in this group came from different professional backgrounds and represented a broad range of digital competencies, from low to high levels of experience.

The third group included six older adults in need of care, including individuals living with dementia. This group was of particular relevance because this sample had the least amount of digital skills and are rarely involved in the development and evaluation of digital creative tools.

The different group constellations made it possible to investigate how *ArtEater* was encountered by participants with differing relationships to artistic practice, digital technologies, everyday life, and cognitive impairment. The project therefore examined how digital creative participation could be supported under diverse conditions rather than assuming a single form of “older user.”

### **Data Collection and Material**

Data collection took place across two research cycles: the first cycle was conducted in summer 2024 and the second cycle took place during summer and autumn 2025. Each cycle comprised three live test sessions per participant group.

Each live-test session lasted between two and three hours and combined the exploration of the digital drawing tool with an art educational approach. At the beginning of each session,

participants were invited to explore the functions of *ArtEater*. This phase enabled them to become familiar with the interface, test different tools and experiment with possibilities for digital drawing and image creation.

The exploration phase was followed by an art educational input based on multisensory art reception. Within the thematic framework *Memories of Summer*, participants engaged with selected artworks and discussed visual motifs, colours, associations, and their own experiences related to summer to “generate” their own images in their heads. Participants were not expected to reproduce the artworks shown. Rather, the artworks functioned as starting points for personal reflection, exchange, individual visual experimentation, but also as inspiration how for example water or flowers can be drawn.

The sessions were documented through recordings of workshop settings, group discussions, and interviews. In addition, the digital drawings and other creative artefacts produced during the live tests formed part of the research material. All sessions were included in the analysis. The material was anonymised before analysis in order to protect the identity of the participants.

The data were analysed using qualitative content analysis (Kuckartz & Rädiker, 2024). This approach made it possible to examine participants’ experiences with *ArtEater*, their engagement with digital functions, their creative processes and their reflections on technology, art, and everyday life. The analysis also considered participants’ feedback on the usability, accessibility, layout, and functions of the tool, as well as their wishes for future development.

The creative artefacts were included as part of the qualitative material because they made visible how participants engaged with visual design, digital functions, and individual creative ideas. Besides the analysis of the participants’ ability to operate individual functions correctly, it was also examined how creative practice could support the development and articulation of digital interests, aesthetic decisions, and connections between art, technology, and everyday life.

## Results

The findings indicate that *ArtEater* enabled different forms of digital and creative engagement across the three groups. Participants approached the tool with highly diverse previous experiences of artistic practice and digital technology. Some had extensive experience with analogue art but little experience with digital tools; others had digital experience but had not drawn or painted for many years; still others had not previously used a computer or tablet. The live tests therefore made visible both the potential and the limitations of a low-threshold digital drawing environment.

### Re-engaging With Creative Practice Through Digital Tools

For some participants, the live tests did not only represent an encounter with unfamiliar digital technology, they also created an opportunity to return to creative practice after a long interruption. One older participant stated, “I haven’t painted in 50 years, and I admit it. But if you practice, just a little, and get familiar with the functions [...], something quite useful comes out in the end.”

This statement indicates that the participant experienced both the creative process and the digital environment as unfamiliar at first. However, he described practice and familiarisation

with the functions as enabling factors. His reflection suggests that the development of digital competence and the rediscovery of creative confidence were closely connected. The participant did not describe the tool just in terms of technical difficulty, instead he related the learning process of digital functions to the possibility of producing an image that he considered meaning- or successful.

A similar experience was expressed by a woman in need of care who had not previously used either a tablet or a computer. During the live tests, she tried both devices and ultimately preferred the computer. She was particularly interested in the movement of the cursor and in the experience of creating images through the screen. She stated, “Painting with ArtEater was a lot of fun for me. [...] The flowing, expressive painting felt great. I really liked it.”

Her statement highlights that digital drawing was not experienced merely as a technical task. The movement of the cursor and the visual transformation of gestures on the screen became part of an expressive and enjoyable creative process. This finding is particularly relevant because the participant had no previous experience with computers or tablets. It suggests that digital creative engagement may be possible even when prior digital experience is limited, provided that participants have sufficient time, support, and opportunities for exploration.

### **Low-Threshold Access and Creative Possibilities**

Several positive findings concerned the accessibility and creative potential of *ArtEater*. Participants described the tool as offering an easy entry into digital drawing. The combination of art educational intervention and opportunities for individual design was perceived as particularly helpful. Personal modifications enabled participants to develop individual images rather than merely complete predefined tasks.

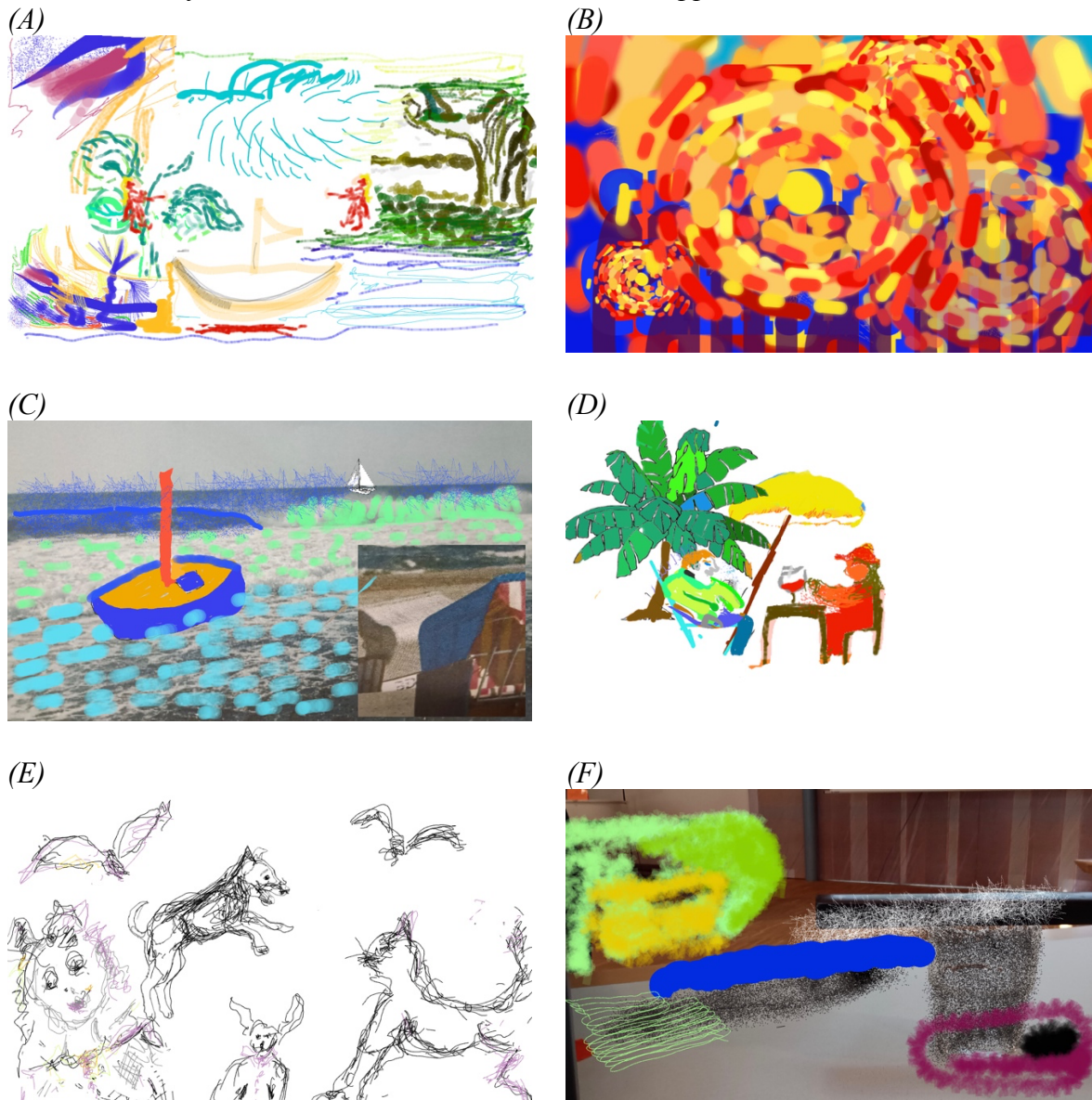
The older adults also drew inspiration from analogue artworks. The integration of artistic references within the art educational concept appeared to support the development of visual ideas and to connect digital drawing to established forms of artistic engagement. Participants emphasised that the tool offered many creative possibilities with comparatively little effort. The enjoyment of the activity was repeatedly expressed in statements such as: “*It was fun!*”

The creative artefacts provide a further perspective on participants’ engagement with *ArtEater* (Figure 3).



### Figure 3

*Selected Anonymized Creative Artefacts Produced During the ArtEater Live Tests: (a) and (B) Creative Older Adults, (C) and (D) Digitally Diverse Older Adults, (E) and (F) Older Adults in Need of Care. The Works Illustrate Individual Approaches to Col*



They show how software functions, personal experience in terms of *Memories of Summer*, and individual decisions were combined in different ways. The works therefore form part of the qualitative material, making visible both the usage of digital functions and the development of personal visual ideas.

### Barriers and Technical Challenges

The live tests also revealed several barriers. Some participants experienced technical problems, including software bugs that resulted in image-loss. Such experiences interrupted creative processes and could undermine confidence in the digital environment.

The layer function was perceived as complicated by some participants. While layers can offer expanded creative possibilities, they can also require abstract spatial thinking and an

understanding of how different visual elements are arranged within the programme. The function therefore supported some forms of creative work while creating difficulties for other users.

Participants also noted that some functions or interface elements were too small. For individuals with shaky hands or fingers, the precise selection of tools and functions slowed down the drawing process. These observations show that accessibility concerns the size, placement, responsiveness, and comprehensibility of interface elements as well as the number of available functions.

### **Wishes for Future Development**

Participants had several wishes for the future development of *ArtEater*. One recurring request concerned different levels of complexity. Participants expressed the need for modes that would allow users to choose between a more reduced interface and a more extensive range of functions. This wish has since been implemented within the ongoing development of the tool.

The older adults also expressed interest in the potential of artificial intelligence as a complementary creative tool. Rather than replacing individual drawing, AI-based image generation was discussed as a possible extension through which users could experiment with and critically reflect on AI-generated images in relation to their own artworks. This aspect is currently being developed within the project.

A further wish concerned opportunities for online communication. Participants imagined possibilities to communicate and share creative work digitally by connecting the drawing environment to forms of social exchange. This points beyond the individual use of a drawing tool and towards the potential of creative digital environments to support new forms of connection and participation in a safe online space for artistic expression and telling stories.

### **Imagination, Care and Technological Futures**

The discussion of AI also led one digitally experienced participant to imagine a possible future connection between drawing, care, and assistive technology. He stated, “ArtEater is basically... well, you’re sitting in the nursing home, painting a banana on the tablet, and then the service robot comes and brings you a banana.”

The statement connects creative activity with a future-oriented scenario of everyday support in a nursing home. The participant imagines a situation in which a digital drawing is not confined to the screen, but becomes linked to care technologies and an everyday need.

This example cannot, on its own, be taken as evidence of a general position among older adults. However, it shows that at least one participant connected creative digital practice with broader technological imaginaries. His example also suggests an awareness of future care needs and of the possible role of assistive technologies in later life by relating it to questions of autonomy, care, and everyday support.

### **Individual Limits of Participation**

The findings also show that a participatory and low-threshold approach cannot remove all barriers for every participant. One participant from the group of creative older adults withdrew

after the second study. The digital drawing process appeared to be too demanding for him, particularly because he was unable to achieve the artistic goals he had set for himself. In contrast, he was able to realise these goals within his established (analogue) sculptural practice.

This demonstrates that creative experience in analogue media does not automatically transfer to digital artistic practice. For participants with high personal expectations regarding artistic quality, the technical possibilities and limitations of a digital drawing environment may be experienced as restrictive. The case therefore points to the importance of recognising non-participation, frustration and withdrawal as meaningful findings.

## Discussion

The findings indicate that low-threshold creative tools can offer meaningful opportunities for digital participation in later life. Across the different groups, *ArtEater* enabled participants to encounter digital technology through art educational intervention, individual expression, and artistic decision-making. Digital skills were developed in a context connected to concrete creative activities. Participants explored functions in order to draw, modify images, respond to artistic inspirations, and realise their own creative ideas.

The participant who had not painted for 50 years illustrates this connection particularly clearly. His statement shows that digital learning and creative learning occurred simultaneously. Familiarisation with the functions of the tool was linked to the possibility of producing an image he considered useful. Creative practice can therefore provide a meaningful framework for developing digital competence, especially when technical operations are embedded in personal interests and creative intentions.

The experiences of the woman in need of care are similarly relevant. Despite having no previous experience with computers or tablets, she engaged with both devices and described the digital drawing process as enjoyable and expressive. Her preference for the computer demonstrates that assumptions about the most suitable device should not be made in advance. Tablets are frequently considered intuitive, yet the computer-based cursor offered her a form of visual and physical control that she found appealing. This underlines the importance of testing different forms of interaction with participants instead of determining appropriate interfaces just through technical assumptions.

At the same time the negative findings demonstrate that low-threshold access must remain an ongoing design task. Bugs leading to image loss, small functions, difficulties with layers, and limitations caused by shaky hands could interrupt creative processes and reduce confidence in the tool and oneself. These observations support the participatory research design of the project. Accessibility cannot be fully defined before a tool is used by its intended participants. It requires continuing examination and revision through direct encounters with diverse users.

The request for different complexity modes is particularly relevant in this respect. A single interface cannot adequately address the different needs of creative older adults, digitally diverse participants, and people in need of care. A more flexible system can provide reduced functions for participants who require orientation and clarity while retaining extended creative possibilities for users who wish to experiment with more complex tools. The implementation of different complexity modes shows how participant feedback can directly shape technological development.

The findings also challenge perspectives that understand older adults primarily through vulnerability or technological deficit. The participant's reflection on AI, drawing, service robots, and care demonstrates a desire for shaping futures. His statement connects artistic practice with questions of autonomy, care, and technological support. Although this example must not be generalised, it indicates that older participants can imagine technologies as resources that may shape future forms of care and everyday life.

The withdrawal of one creative participant further demonstrates that participation must include the possibility of refusal, frustration, and discontinuation. His established sculptural practice enabled him to pursue artistic goals that he could not achieve through digital drawing. This does not diminish the potential of *ArtEater*. It makes clear that no single (digital) tool will be appropriate for all users or all forms of artistic practice. Participatory design needs to remain open to divergent experiences, including those in which a tool does not meet the expectations or needs of a participant.

Overall *ArtEater* functioned as a participatory creative environment in which digital engagement was connected to individual interests, creative exploration, and reflections on technology in everyday life. Its potential lies in creating situations in which older adults can test, question, shape, and imagine digital technologies in relation to their own experiences and futures.

## Conclusion

This study examined how *ArtEater* can support creative practice and digital participation among heterogeneous groups of older adults, including individuals living with dementia. The findings show that digital drawing can provide an accessible entry point to digital engagement when it is connected to art educational intervention, individual expression, adequate time for exploration and direct support within a group setting. Participants engaged with the tool in many different ways: some returned to creative activity after long interruptions, some explored previously unfamiliar digital technologies and some related their creative work to broader questions of care, AI and tech-futures.

The results also demonstrate that accessibility cannot be understood as a fixed technical feature. It develops through the ongoing interaction between users, interface design, creative tasks and opportunities to provide feedback. Technical problems, small functions, complex tools, and the withdrawal of one participant revealed limitations that must be taken seriously within participatory processes.

The study is limited by its small and context-specific sample. The findings are therefore not intended to be generalised. However, they provide insights into how older adults with diverse experiences of art, technology, and care can contribute to the development of digital creative environments. Future research should continue to involve older adults, including people living with dementia, as active contributors to design and evaluate digital tools to give them a voice. Creative approaches should be recognised as a relevant form of digital education and participation in later life.

### **Declaration of Generative AI and AI-Assisted Technologies in the Writing Process**

The author declares that an AI-assisted writing tool was used for language refinement. All research ideas, study design, empirical material, analyses, interpretations and conclusions originate from the author's own research. The author reviewed and takes full responsibility for the final manuscript.

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