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The use of AI for Education in Third Age: the role of EU project

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Abstract
Society today is struggling with various challenging phenomena. This manuscript aims to analyse two phenomena, ageing and digitalisation, in the context of education. Both phenomena are an important area of research: the complexity of an ageing population and the intersection of technology and education. In this context, artificial intelligence (AI) offers the opportunity to improve the educational experiences of older adults. AI-driven tools and educational initiatives can be tailored to the different learning preferences and cognitive abilities of this population, promoting engagement and knowledge retention. The adaptability of AI systems enables personalised learning pathways that address individual challenges and promote lifelong learning and cognitive health in older learners. This research will highlight the critical role of AI in reshaping educational paradigms and its potential to facilitate knowledge acquisition and empower an often-marginalised population. Finally, focusing on the role of international projects will allow us to understand the trends in EU research and funding. Understanding the impact of AI on education in the third age and EU funding invites a broader discussion on inclusivity and innovation in the educational landscape.

Keywords: **third Age education, Third Age Inclusion, AI, EU projects**

1. Introduction

The third age is characterised by a renewed time-out from work, a phase of frailty and, in the meantime, an increase in "free time" that can be used for leisure and opportunities for personal development. Technology is increasingly finding its way into daily life. The intersection of artificial intelligence (AI) and ageing populations cannot be overstated. It is important to examine how artificial intelligence (AI) affects older populations. Studies show that older adults' past experiences with technology significantly shape their views on information and communication technology (ICT). Those who are more engaged with technology tend to have more confidence and a better attitude towards new tools (González et al., 2012). If we understand the specific problems of this age group, such as mental decline and loneliness, we can develop AI solutions that improve social interaction and mental engagement.

Research shows that technical training can promote cognitive and emotional health (Shapira et al., 2007). This knowledge is key to developing user-friendly interfaces and apps that meet the specific needs of older people. It is particularly important for education, as it provides older adults with the opportunity to continue learning and adapting to new technologies. The use of technology, such as AI learning tools,

is very important in this context as it helps to overcome the difficulties older people have in using technology. Studies show that older adults benefit from educational activities that promote social relationships and emotional health, which emphasises the value of intergenerational learning in the third age (Barroso et al., 2022). In addition, knowledge of how older people view and use AI tools can help teachers create learning experiences that work well for them and are easily accessible to enhance education for older learners (Koka, 2024). Focusing on this connection drives innovation and ensures that technological advances adequately support older adults by improving their independence and quality of life and reducing risks associated with falling behind in technology. AI technologies enhance personalised learning experiences through adaptive learning platforms that tailor educational content to individual needs, promoting an inclusive environment. These platforms utilise data analytics to assess learner progress, allowing for immediate feedback and targeted interventions, which is crucial for older adults who often face particular learning challenges (Kyung et al., 2020).

In addition, AI-powered tools facilitate social interaction and engagement through virtual classrooms and discussion forums, combating the isolation that older people often experience. The integration of AI into educational practise emphasises the importance of policy frameworks that support equal access to technology, especially for marginalised groups. For example, initiatives that promote the development and funding of age-appropriate educational programmes are crucial to ensure that AI technologies are accessible and beneficial to all, including those in the third age (Alexin et al., 2021).

2. AI in Third Age Education

The integration of Artificial Intelligence (AI) into educational initiatives for older adults can enhance learning experiences by creating individualised and engaging environments that meet their needs. AI technologies can enable personalised learning pathways that adapt to the cognitive abilities, learning pace and interests of each participant, creating inclusive educational opportunities. In addition, immersive technologies such as augmented and virtual reality can stimulate cognitive engagement and sensory experiences, counteracting the cognitive decline that often accompanies ageing (Lee et al., 2019; Schlomann et la, 2024). As demonstrated in interprofessional simulation courses, improved collaboration through AI-driven platforms also promotes effective communication and empathy among learners, reflecting a shift towards integrated models of care (Baillie et al., 2017). Through the use of AI, educational programmes can enrich the learning landscape for older adults and bridge the gap between traditional educational practises and modern, interactive methods.

Education and training are crucial for older adults' attitudes towards artificial intelligence (AI) and influence their perception of its relevance and usability in everyday life. Programmes to improve digital literacy are crucial. They provide practical skills and promote confidence in the use of new technologies, as shown by

studies in which improved ICT education led to higher life satisfaction among participants (Shapira et al., 2007). By addressing educational deficits, older adults can better understand the benefits of AI and thus reduce fears based on ignorance or misconceptions about technology. As the results of a course on tele-services for older people show, previous experience with technology correlates positively with openness to AI applications, emphasising the need for targeted training that addresses the specific motivations of older learners. Fostering a supportive learning environment that emphasises the accessibility of AI can mitigate resistance and promote an adaptive mindset in older adults.

3. AI in Third Age and Inclusivity

The integration of artificial intelligence (AI) technologies into the lives of older people has a significant impact on improving their quality of life and general wellbeing. By facilitating social contact and providing personalised health information, AI can alleviate loneliness and promote a sense of belonging among seniors. Research has shown that the use of ICT can promote independence. Older adults use technology for practical communication, health monitoring and social engagement, as shown by (Kerryellen et al. et al., 2014). In addition, AI-driven applications can tailor content and services to individual needs, improve usability and reduce barriers to technology use. For example, users who participate in technology training report increased self-confidence and social activity, which emphasises the role of AI in empowering seniors, as mentioned in (Xu et al. 2024, Peral, 2021). The ability of AI technologies to adapt to the specific preferences and abilities of older adults will be critical to bridging the digital divide and ensuring their continued engagement in a technology-driven society.

Recent advances in artificial intelligence (AI) technology have the potential to significantly improve social connectivity for older adults and address the pervasive problem of isolation in this population. AI-driven platforms can provide user-friendly communication tools that enable seniors to engage more actively with their family and friends, which is crucial for their mental health and well-being, as emphasised in (Shapira et al., 2007). In addition, AI applications, such as smart health monitoring systems, have been shown to help older people maintain vital relationships by facilitating the exchange of health information and coordination of care between family members, alleviating feelings of dependency and loneliness (Kerryellen et al. et al., 2014). By tailoring content to individual preferences and learning abilities, these technologies can engage seniors more effectively, making technology feel less like a luxury and more like a necessity in daily life. Consequently, fostering meaningful interactions through AI promotes social engagement and empowers older adults to better navigate the digital world (Selwyn, 2004).

In the wake of technological change, the use of artificial intelligence (AI) in communication tools offers good opportunities to improve the engagement of older people. Many seniors struggle with traditional communication tools because they are difficult to use, leaving them feeling isolated and disconnected. AI can help solve

these problems by creating more user-friendly interfaces and more personalised experiences. For example, AI technologies such as speech recognition and natural language processing can help older users interact with smart devices and reduce the anxiety often associated with using technology (Kerryellen et al., 2014). Furthermore, studies show that improving digital skills through organised training can significantly change older people's attitudes and behaviour when using technology (Chattaraman et al. 2019). Therefore, if we focus on developing AI applications that meet the needs and preferences of older adults, we can promote more social engagement and a better quality of life through technology-enabled communication.

The potential of artificial intelligence (AI) to combat social isolation and loneliness in older adults is becoming increasingly clear in current research. By facilitating social interactions and improving communication, AI applications, such as virtual assistants and social robots, provide valuable companionship and engagement for seniors who often struggle with mobility limitations or limited access to social networks. The findings of (Shapira et al., 2007) show that structured computer training increases older people's confidence in using technology and leads to greater social connectedness via online platforms. Furthermore, the integration of AI into telemedicine solutions enables timely access to healthcare services, allowing older adults to maintain their independence while reducing feelings of loneliness associated with health-related anxiety. As (Kerryellen et al., 2014) has shown, ongoing support and the establishment of user-friendly interfaces can ensure sustained engagement with technology and ultimately create a vital ecosystem that fosters social connections and improves seniors' quality of life. This multi-faceted approach highlights the transformative ability of AI to alleviate loneliness. It suggests that customised technological solutions can significantly enrich the social experiences of older adults, addressing a major public health issue.

4. AI for inclusive education in the third age

The integration of AI-driven personalised learning pathways can significantly improve the educational experiences of the third age and promote lifelong learning and personal growth. Inclusive education for the elderly is receiving a lot of attention as societies struggle with a growing ageing population. A closer look shows that old education systems often fail to meet the diverse needs of older students. There is a need to turn to new methods, including the use of artificial intelligence (AI). Knox, Wang and Gallagher's (Knox et al., 2019) review of the role of AI in promoting inclusive practises highlights its ability to customise learning. However, they also warn that over-reliance on personalised help can lead to exclusion. Furthermore, programmes such as the Newcastle University Ageing Generations Education (NUAGE) demonstrate successful ways to engage different generations and enhance the learning experience for older adults and younger learners (Forster et al., 2021).

As mentioned in (Forster et al., 2021), programmes that mix generations, such as Newcastle University's Ageing Generations Education initiative, show how effective personalised methods can be. They show that older participants can improve course development while increasing younger learners' confidence in their interactions. Furthermore, the issues highlighted in (Jeremy Knox et al., 2019) in finding a balance between AI-driven personalised learning and social aspects of education highlight the need for a comprehensive approach. By focusing on understanding and group learning, AI can help to bridge the generation gap and ensure that educational programmes effectively engage older adults and create a sense of belonging and community for all learners (Du et al 2024; Cacico et al 2023).

Researchers point out that while AI can improve the outcomes of personalised learning, it should work with community engagement and collaborative efforts to ensure that these technologies fit into the everyday lives of older students (Knox et al., 2019).

The use of AI technologies to educate older adults highlights important systemic issues and ethical questions that need to be explored to ensure fairness and access. One major issue is the digital divide, where many older learners struggle with technological skills, exacerbated by differences in income levels. This divide raises the question of how AI resources are distributed equitably and whether they are able to support inclusive education, as Ferguson's research on inclusive practises shows (Forster et al., 2021). Furthermore, as Knox, Wang and Gallagher mention, the use of AI for personalisation often ignores the importance of group participation, which is central to building community and ensuring that older adults feel valued and included in educational discussions (Knox et al., 2019). The conversations about AIEd show that there is often a mismatch between technology-based methods and the community goals stated in (Knox et al., 2019). This mismatch raises important questions about inclusivity and the need for genuine social connections between learners.

The application of adaptive learning technologies is fundamentally changing the educational landscape for older adults, placing an emphasis on personalised engagement. Through the use of artificial intelligence, these technologies can tailor learning experiences to individual needs, enabling deeper interaction with learning content. Research shows that adaptive systems significantly increase motivation and retention rates, leading to more meaningful learning experiences. For example, technologies used in the creative arts have improved the cognitive abilities and behaviours of people with dementia through tailored interventions (Harwood et al., 2019). This adaptive approach promotes intellectual engagement and social relationships between learners and enables collaborative experiences that enrich understanding. In addition, immersive environments, such as those being developed for museums, are an example of how interactive storytelling and digital avatars can engage older learners and make knowledge acquisition an engaging and empowering process. Adaptive learning technologies offer profound opportunities to revitalise education for the ageing population and promote lifelong learning and engagement.

It is important to pursue a balanced strategy that combines technological advancement with community and ethical engagement. This will help ensure that education systems are truly inclusive, especially for older adults. To move forward, targeted efforts are needed to promote empathy, trust and active participation in creating educational structures that meet the diverse needs of learners.

The use of artificial intelligence (AI) in inclusive education for older adults has both useful benefits and serious difficulties. On the one hand, AI can enable personalised learning experiences that help learners to engage and adapt learning materials, which is crucial for older students with different learning styles. This is supported by the findings of (Knox et al., 2019) highlighting the role of AI in enhancing personalised education. However, over-reliance on technology could compromise the important human bonds that create effective learning spaces. As (Forster et al., 2021) highlights, building relationships and trust is key to intergenerational teaching; therefore, it is important to embrace the social aspects of learning.

5. Method

The aim of the study is to find out whether there is a funding project on the topics of AI and education in the third age. The sample was selected using the CORDIS portal for Horizon project results. This platform allows us to search for funded projects, including those with the prospect of funding. The platform makes it possible to clean up the results by inserting various philtres, as shown in Figure 1. The philtres on the CORDIS platform are different and offer the possibility to filter the project by content:

Collection: here you can select different options: Projects, Results Packages, Project Info Packages, Results in Brief, News, Podcasts.

Area of application: You can select various options here: Industrial technologies, basic research, transport and mobility, health, society, security, climate change and environment.

Language: here you can select different languages for the selected results: Deutsch, English, Español, Français, Italiano, and Polski.

Programme: here you can select the different funded programmes: Horizon Europe Framework Programme, Horizon 2020 Framework Programme, FP7 Framework Programme, FP6 Framework Programme, FP5 Framework Programme, FP4 Framework Programme, and FP3 Framework Programme. This step is important because with this filter it is possible to divide a project by year, as each programme applies to a different period: FP4 for the period 1994-1998, FP5 for the period 1998-2002, FP6 for the period 2002-2006, FP7 for the period 2007-2013, FP8/Horizon 2020 for the period 2014-2020, FP9/Horizon Europe for the period 2021-2027

Last update: This filter allows you to select the period from which you want to make the result more accurate.

Project ID acronym: This filter is used if the name of the project to be searched for is known

Scientific field: You can select various options here: Agricultural Sciences, Engineering and Technology, Humanities, Medicine and Health Sciences, Natural Sciences, Social Sciences.
Start/end date Here you can select a period in which the project started or in which the project ended.
Total cost: This filter allows you to select a project according to the total cost of the project (EU funding + co-financing)
EU contribution: with this filter it is possible to select a project according to the funding received from the EU by specifying the sum from Euro to Euro.
Cal ID: this filter allows you to select a project that has been selected as part of a specific call.
Topic ID: this filter allows you to select a project selected under a specific topic.
Organisation characteristics: 3 Filter *Organisation name*, *Organisation country*, *Organisation region*.

Figure 1: CORDISS search platform

The selection of the sample was carried out in various steps:
1. Keywords 'AI and Ageing' - 1315 results were obtained by using the Boolean operator AND
2. Adding the keyword 'education', 'AI and Ageing and Education' - 864 results were obtained.
Considering the purpose of the research, the filter collection was used by selecting Projects, Results Packs, Projects Info Packs, and Results in Brief - 773 cases were obtained.
Another filter was the domain of the application. The project domains Transport and Mobility, Climate Change and Environment and Industrial Technologies were excluded. This reduced the sample to 123 projects.
By using the science domain filter, the projects on natural sciences and agricultural sciences were excluded - the sample was reduced to 18 cases.
As the CORDISS search platform does not offer the option of using the Boolean term "or" for search accuracy, a new level of keywords was implemented.
Keywords "AI and older*" - 197 results were obtained

By adding the keyword education, the sample was reduced to 87 results.
By using the same philtres as for the application area and research area, the sample was reduced to 5 results.
Once the projects are selected, each one is analysed. Fourteen projects were excluded as they did not match the characteristics of the sample.
The research results of the European project proposal were analysed using the qualitative approach. Text analysis is the process of examining textual material to capture key concepts and themes and uncover hidden relationships and trends without needing to know the exact words and terms used by the authors to formulate these concepts.
Voyant tool was developed by two professors Stefan Sinclair and Geoffrey Rockwell. Voyant tool is for the analysis of digitally recorded texts and it is an s open -source online platform the analysis of digitally recorded text that can be used for free
As can be seen in Figure 2, the most frequently used words in the project objectives are "care" and "health".

Figure 2 Cloud with the most frequently used words (Voyant tool image)

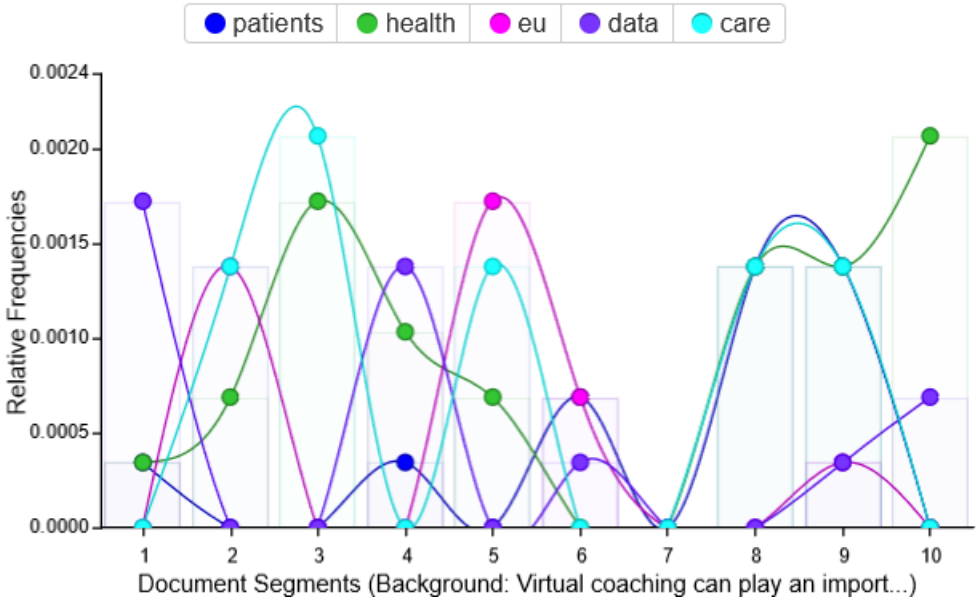

Figure 3 Trends on words use

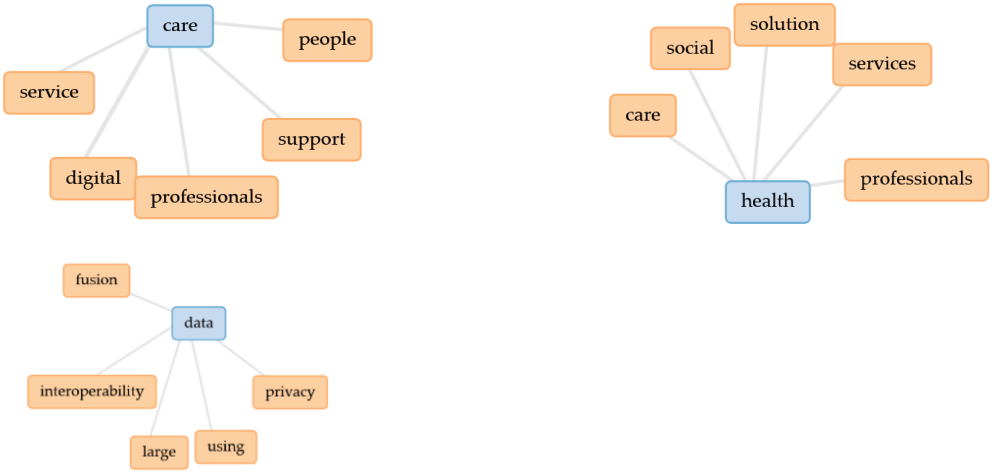

Figure 4 Links with other words

The placement diagram shows a network diagram of the words that occur most frequently in the vicinity of a particular word. Keywords are shown in blue and nearby words in orange. Figure 4 shows the links between the words. "Care" is mostly linked to service, support, professionals, digital and people. The word health is mainly linked to care, social solution services and professionals. The word data is linked to fusion, interoperability, extensive use and data protection. The peripheral

word professional is linked to care and to health; the word "health" is linked to the word care, but not vice versa.

Care is mainly used to indicate support, while health is used in the context of solutions.

The second step was to review the European funding projects that deal with education. The European funding portal does not allow the use of different keywords in combination with "and" or". Therefore, we initially used three keywords separately: Artificial Intelligence, Education and Ageing. The screening was done manually, as there is no way to delete the results at the end. Three projects were found that met the requirements.

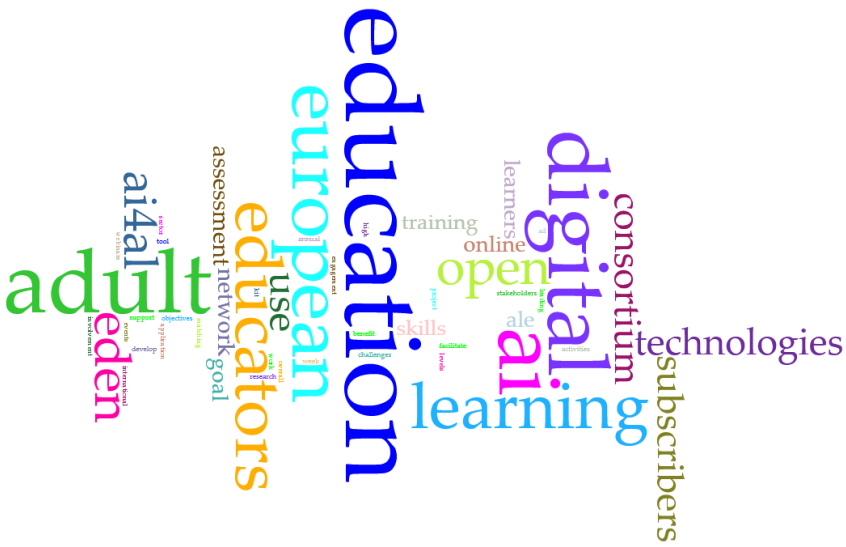

Figure 5 Cloud with mostly used words in selected Erasmus projects Objectives (Voyant tool image)

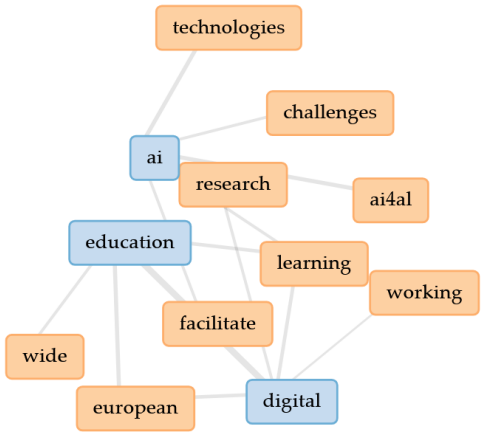

Figure 6 Links with other words

If you analyse the context, you can see that AI is mainly associated with facilitating AI for all learning technologies and challenges.
Education is mainly related to broad learning with digital and European means.
Digital is mainly related to research, labour, learning, education and Europe.
The answer to our research question "Do the European projects have an impact on the education of older people to create a more inclusive environment through the use of AI among elderly?" is no, not directly, as the results of the text analysis show that the world of inclusion of older people has not been utilised.

6. Discussion

Analysing the projects reveals several weaknesses in research involving older people in the use of AI:
- Accessibility and usability of AI technologies: one of the main problems for older people in using technology is the complexity of interfaces and the lack of basic digital literacy. Although many projects aim to develop user-friendly technologies, further efforts are needed to make AI tools even more intuitive and accessible. When developing technologies, the cognitive and physical needs of older people must be considered, e.g. through simple language interfaces, legible fonts and ergonomic design. Involving older people in the design and testing phases of technologies ensures that these tools are effectively tailored to their abilities and preferences.
- Digital literacy and ongoing training: Digital literacy is essential to ensure that older adults can fully benefit from AI technologies. While many projects promote the use of technology, there is a great need for ongoing education programmes to accompany the adoption of new technologies. Many older people can feel overwhelmed or excluded if they are not supported by accessible, progressive and

personalised training programmes; implement ongoing training programmes that go beyond the initial introductory phase and provide long-term support.

- Equal access to technology: Not all older people have equal access to technology, especially those who live in rural areas or have limited economic resources. It is crucial that future European projects address existing inequalities in access to technology and digital literacy and ensure that AI is available and accessible to all older adults, regardless of their socio-economic status. Future projects should include plans for free or subsidised access to digital technologies for economically disadvantaged seniors and the development of digital infrastructure in rural and remote areas.
- Intergenerational approach: Many current projects focus exclusively on older adults. However, an intergenerational approach, where young and older people learn and use AI technologies together, could improve educational and social outcomes. Intergenerational interaction not only helps older people to better understand technology, but also promotes social cohesion. Projects should encourage more intergenerational activities, such as joint learning courses between young and older people, to improve both the digital skills of older adults and the younger generation's understanding of the challenges of ageing.
- Psychological and social support: The integration of AI into the lives of older adults should not only be technical, but also emotional. More attention needs to be paid to the psychological aspects. The use of technology must be accompanied by psychological support to reduce social isolation and loneliness, which are common among older adults. Develop and promote AI technologies that not only help with practical tasks but also enable meaningful social interactions and psychological support, such as AI communication systems that can connect older adults with their loved ones or provide virtual psychological support.
- Ethics and safety: The use of artificial intelligence raises ethical and safety concerns, especially when it comes to older adults. The protection of personal data and transparency in AI decision-making processes must be guaranteed. Older people are a vulnerable population and trust in AI technologies must be built through secure, transparent and privacy-respecting systems. Projects must take a rigorous ethical approach and ensure that older people are informed and can understand how their data will be used. In addition, clear ethical guidelines must be established for the use of AI with older people to protect their autonomy and dignity.
- Scalability and sustainability of projects: Many pilot projects to develop innovative technologies remain on a small scale and are not fully implemented across Europe. To maximise impact, technologies need to be scalable and deployed on a larger scale so that the benefits of AI reach a greater number of older people in Europe. Invest more in moving from pilot projects to large-scale implementation to ensure that positive results can be replicated in different local and cultural contexts. This requires the involvement of public institutions, non-governmental organisations and the private sector to ensure long-term sustainability.

To improve the impact of future projects, it is important to focus on accessible, educational and scalable solutions that can be implemented equitably. The combination of an intergenerational approach, improved access and enhanced digital skills for older people represents a pathway to a future where AI is not just a technology, but a means of creating a more inclusive and connected society for all ages.

The increasing integration of artificial intelligence (AI) into healthcare management for older adults represents an innovative approach to addressing their unique healthcare challenges. AI technologies can improve access to healthcare resources and provide older people with tools for better disease management and social interaction. As described in (Shapira et al., 2007), structured computer training for older adults has significantly improved their mental health, emphasising the potential of technology to enrich the lives of older people through effective health management strategies. In addition, AI systems can facilitate personalised healthcare by analysing large amounts of health data to tailor treatments to individual needs, promoting a sense of autonomy and ownership in older adults. However, it is important to recognise potential barriers that affect technology adoption, such as intimidation or negative attitudes towards technology, as highlighted in (Kerryellen et al., 2014). Removing these barriers and ensuring that AI applications are user-friendly is critical to maximising their benefits and promoting positive health outcomes in this population.

The integration of artificial intelligence (AI) into personalised healthcare represents a transformative advance in medical monitoring, particularly for older adults. Through the use of AI-driven systems, healthcare providers can tailor treatment plans based on individual health metrics, enabling proactive management of chronic conditions that are prevalent in this population. Research shows that older adults who engage with technology, particularly through computer training programmes, have higher health literacy and improved well-being, highlighting the benefits of such innovations (N. Shapira et al., 2007). Furthermore, as AI algorithms analyse vast amounts of health data, they can identify patterns and predict potential health problems before they occur, enabling timely interventions. The importance of social relationships and mental engagement, emphasised by studies on ICT use among seniors, shows how AI can improve not only health outcomes but also quality of life as older adults stay connected and active in society (Kerryellen et al. et al., 2014). This holistic approach highlights the need for personalised healthcare solutions and ultimately underlines the case for sustained investment in AI technologies for the ageing population.

The integration of artificial intelligence (AI) in healthcare poses a variety of challenges for older adults, largely due to socio-technical barriers. Above all, attitudes towards technology have a major influence on the acceptance of AI. Many older adults' express ambivalence or anxiety due to the perceived complexity and lack of familiarity with digital platforms (Thompson et al., 2001). This feeling is compounded by the fact that older adults often lack robust socio-personal support

systems that facilitate technology adoption, as shown by studies highlighting the barriers of intimidation and low motivation (Kerryellen et al., 2014). Furthermore, discrepancies in digital literacy, strongly influenced by age and educational background, result in varying levels of skills and confidence, creating a significant gap that hinders effective interaction with AI technologies (Pihlainen et. Al 2021; Bansal et al., 2023). To overcome these barriers, customised educational initiatives are required that aim to align the functions of technology with the experiences and needs of older people to ultimately create a more inclusive environment for the adoption of AI in healthcare.

7. Conclusion

The integration of artificial intelligence into adult education, especially for people in the third age, requires the development of strategies that prioritise lifelong guidance and support tailored to the specific challenges of this population group. As mentioned earlier, lifelong guidance aims to improve support for the career development of people at different stages of their lives, thus promoting engagement and learning among older adults (Barnes et al., 2020; Spulber, 2019). Policy makers need to consider how AI tools can facilitate access to information, counselling and mentoring for older learners by removing technological barriers and promoting digital literacy. In addition, understanding the socio-cultural variables that impact youth entrepreneurship in rural areas, as highlighted in existing research, can inform adult education initiatives by taking into account the diverse backgrounds and motivations of older learners. Through a learner-centred approach that incorporates AI, adult education can become more inclusive and enable older adults to actively participate in lifelong learning and personal development, which is critical to their wellbeing and contribution to society.

As the educational landscape for older adults continues to evolve, the integration of artificial intelligence holds immense potential for enhancing learning experiences. Future research should focus on developing adaptive algorithms that can tailor educational content to the unique cognitive styles and learning pace of third-age learners. This means not only fostering an understanding of gerontology in the development of AI systems, but also ensuring that these technologies are user-friendly and accessible to individuals with varying levels of technological proficiency. In addition, interdisciplinary collaboration between educators, gerontologists and AI developers is critical to creating holistic educational platforms that not only impart knowledge, but also promote social interaction and emotional well-being. Ultimately, continuous evaluation and development of AI tools is required to refine their effectiveness and ensure that they truly meet the needs of an ageing population that craves lifelong learning opportunities.

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