Feasibility Study of Inclusive Technology Integrating into Learning Modules for the Elderly - A Case Study of a Non-profit Organization in Taipei City

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Abstract

This study attempts to take a non-profit organization serving the elderly in Taipei City as the research object, explore the introduction of technological learning elements on the basis of existing operations, and evaluate how the elderly can learn through technological products and concepts , shorten the technical distance with the younger generation, and increase the feasibility of the interactive education model based on communication; plan and design 4 inclusive-oriented technology courses, provide the elderly with learning, enjoy the interpersonal interaction brought by technology and see the world From the perspective, collect the elderly's promotion factors for technological learning, compile their intervention combinations for technical education to ensure better teaching results, and evaluate the training methods and tools that can significantly increase the utilization rate of technology for the elderly, including physical teaching, multi-teaching assistants Counseling, iPad, materials, manuals, competitions, etc., provide more diversified services for the elderly through the introduction of technological elements, improve the effectiveness of services for the elderly, and become a model that can be replicated to other similar institutions.

Keywords: Inclusive Technology, Non-profit Organization, Elderly, Technology

Introduction

Internationally, the population over 65 years old accounts for 7%, 14% and 20% of the total population, which are called aging society, elderly society and super-aged society respectively. According to the population estimate of the Republic of China updated by the National Development Commission on August 22, 2022, the proportion of people over 65 years old in China has rapidly reached 10% in 2006 from 8.62% in 2000, 12.51% in 2015, and 16.07% in 2020, reaching 17.5% in 2022, and is expected to reach 20% in 2025. That is to say, our country is expected to reach the standard of a super-aged society within 3 years. After people retire from the workplace, they no longer have positions and specialized duties. In addition, as age increases Growth, the degradation of physiological functions, gradually reduce the opportunity to go out, and the time at home is getting longer and longer, resulting in a reduction in the frequency of contact with people and external things. The assistance of digital communication technology can provide the elderly with the ability to communicate with the outside world under the constraints of physiological conditions. New mechanisms for interaction, self-learning and sharing with others, thereby reducing loneliness, improving social networks, and expanding the community of the elderly. However, physiological deterioration such as decreased finger dexterity and memory may also affect the psychological aspects of the elderly learning new technological tools. It is believed that they are unable to learn on their own and require face-to-face guidance to reduce the pressure of learning and improve their willingness to learn. As for the elderly with high social characteristics, even if they are mobile and quick-thinking, they may be unable to participate as they wish due to age restrictions imposed by commercial organizations, such as travel agencies' participation restrictions on the elderly.

The target object of this study is a social service group located in Taipei City that mainly serves the elderly and provides group life opportunities, education and learning, social gatherings, leisure travel, and spiritual cultivation. This study integrates technological connotations into existing courses and activities, and the development can help the elderly learn to use technological products and technological knowledge to increase the quality of interaction with younger generations and peers, and improve the quality of life.

Research motivation and purpose

Shi (2019) research pointed out that the aging society shows three phenomena: insufficient labor force, challenges to the sustainable operation of the social security system, and relative lack of energy for long-term care work. Therefore, the government still places too much emphasis on cash benefits in the allocation of welfare resources at this stage. However, whether there has been any concrete improvement in the phenomenon that Easterners stay in bed longer after retirement, that is, their health maintenance time is shorter after retirement, this study agrees with the Based on the rational reallocation of social welfare resources, it may be helpful to consider strengthening the application of technology and education in existing activities and cooperating with social groups similar to those serving healthy elderly people to introduce activities that can promote lifelong learning and increase interpersonal interaction for the elderly. It can alleviate the negative impact of insufficient energy in the social security system and long-term care, prevent young workers from being unable to concentrate on work due to their dependence on the elderly at home, and alleviate the problem of insufficient labor force in the elderly society.

This study poses two research questions: 1. What adjustments do the curriculum need to make to technology learners with different learning conditions? 2. How to evaluate the learning effectiveness of technology learning courses for older participants?

Literature review

This study intends to discuss the introduction of technological elements, the self-cognition of the elderly and digital learning, lifelong learning and social participation.

Digitalization and digital transformation

Mellor et al. (2008) pointed out that the elderly often has different opinions on the use of technology. Some think that new technologies will be complicated and even cause inconvenience. Cost and privacy are also common concerns. Compared with the elderly who use traditional mobile phones, some Elderly people who are accustomed to using smartphones have higher quality of life and psychological functions. Elderly people who can express their learning motivation towards technological products should be able to reduce the loneliness caused by living alone, increase their connection with the outside world, and be able to enjoy more the things they are used to. environment, daily living abilities can be improved smoothly,

reducing dependence on others and society, maintaining social connections, providing continuous learning opportunities, improving mental health and reducing safety concerns.

Boyd et al. (2014) believe that the level of social isolation refers to the extent to which the elderly spends less time interacting with friends and are unwilling to interact with others; Sum et al. (2008) found that the level of social isolation among the elderly The higher the number, the less time spent online. Kiel (2005) found that the use of technology can enhance the independence of the elderly because they have the ability to use digital technology through online shopping, paying bills, bank transfers, learning new knowledge and participating in chat groups. Through the introduction of technological elements and service platforms, this research injects school resources into the curriculum concept of social groups from digitization, digital optimization to digital transformation stage. Through communication and discussion, respect and understanding, it plans out the A lifelong learning model that is more beneficial to physical and mental health, and embodies the principle of "live until you grow old, learn until you grow old". Nathan and Andrew (2019) believe that the five keys to success in digital transformation are the use of digital tools:

1. Satisfy known customer needs in a better way: Digital technology helps to understand customer needs, and digital contact methods are closer to the information transmission and understanding methods of the younger generation, making digital generate warmth. The customers of this project are the elderly, and the use of digital technology is mostly excluded (exclusion) groups, and the institution has been able to "understand customer needs" to a certain extent through course design and event planning for decades' mastery.
2. Digital and physical complement each other, virtual and real integration: employees must have more customer interaction and professional capabilities, and do not need to fall into the myth of substitution. Employees are encouraged to share their history of social responsibility activities on the company's official website or personal social media. Enhance company reputation.
3. Digital focus is on the customer: Digitization can facilitate the linking of previously separate activities. Change the internal structure, establish internal teams, and give them the capabilities and authority required to complete the project.
4. Set up awards: Give employees opportunities to explore and publish their ideas, such as encouraging members to turn ideas into concepts or create commercial products.
5. Gradual connection is more important: If the problem can be divided into some modules and a middle-level interface can be established, the core of the organization can maintain the stability of operations while experimenting with how to meet customer needs.

Table 1 Summary table of three stages of digital transformation

Stage	Theme	Connotation	This study was performed
1	Digitization	Introduce information technology into the data that relies on manual or paper transmission, build an information management environment, and first generate and store manageable information.	• Construction of basic information of members. • Information management of small databases. • The original "Plaza Walking" course combines teaching on the use of smartphones or smart bracelets to record the elderly's heartbeat, breathing, step counting and other data.
2	Digital optimization	Use information to improve quality and manage progress	• Construction and management of database. • Immediately respond and deal with problems to improve information quality. • Control management progresses. • And provide information and evaluation results to let the elders understand their basic physical condition.
3	Digital transformation	Harnessing the power of digital to create differentiation and competitiveness	• Use and analysis of data. • Chart drawing. • Benefit evaluation.

Sources: Zhan (2020), From this research (2023)

Innovation and Cognitive Theory

Rogers (1995) put forward the theory of innovation diffusion and believed that in the process of marketization of innovative products, consumers can be divided into five types according to the time of product purchase according to the acceptance of technology: innovators, early adopters, early majority, late majority and laggards. , among them, innovators are high-level technology enthusiasts, who express high recognition and reaction to new technology, and are the main purchasers of new products; early adopters also express high interest and recognition to the technological elements of new products, but the real purchase behavior The purchase behavior will only occur after the evaluation of the innovator after the purchase; the early public and the late public are the main sources of profit for the product. At this time, the technology has been standardized and consumers are very familiar with the product, but the price is not likely to rise, and gradually decline; laggards do not recognize technology, and most consumers have not yet generated demand when they already have it, but purchase behavior is motivated by product price cuts. However, due to unfamiliarity with technology, in It is usually easier to cause problems in the operation of the product, and it is not easy for the product to produce the expected benefits, which means that it takes pressure to adopt innovative technology.

Table 2 Correspondence table of science and technology acceptance types of innovation diffusion theory

No.	Type	Proportion	Connotation	This study
1	Innovator	2.5%	• A high degree of technology enthusiasts; • Major buyers of new products.	• Discover and make good use of innovators; • Free to use; • Request to publish your experience.
2	Early adopter	13.5%	• Express high interest and recognition for the technological elements of new products; • The purchase behavior will only occur after the innovator's post-purchase evaluation.	Survey early adopters' perceptions of the APP.
3	Early public	34%	• It is the main source of profit for the product; • The technology has been standardized and consumers are already familiar with the product; • There is no possibility of price increase and it will gradually decline.	Observe how the early public is applied to life
4	Late mass	34%		Develop incentives to encourage late mass use
5	Laggard	16%	• Do not identify with technology; • Purchasing behavior will only occur under the incentive of product price reduction; • Unfamiliar with technology, it is usually easier to have problems in the operation of the product, and it is not easy to make the product produce the due benefits.	Laggards need to exert some pressure

Sources: Rogers (1995), From this research (2023)

Merriam and Caffarella (2020) believe that personal life events will trigger their learning. Significant learning often occurs in good times, while transformational learning usually occurs in adversity, because deep feelings in adversity can promote the combination of self and experience. Pan et al. (2015) pointed out that the elderly usually resist change traditionally, but if they think that new technological products or technological technologies are easy to learn and easy to use, they may adopt new technological products, which is perceived ease of use. Mahoney (2010) research pointed out that older people with higher innovation ability are more likely to accept and use remote monitoring technology. The Cognitive School believes that humans have the desire to solve doubts, to be curious, to monitor, and to be rewarded. Learners observe other people's enthusiasm and interest in learning, thereby enhancing learners' learning motivation (Schunk & Pajares, 2004). Cognitive theory emphasizes the acquisition of knowledge and skills, the process of psychological structure, and the processing of information. Learning is an intrinsic mental process whose construction, acquisition, organization, encoding, rehearsal, storage, and retrieval of memory are central topics of cognitive theory. Cognitive theory attaches great importance to the individual differences of learners and believes that physical and mental development affects learning; memory is particularly important for learning. How information is learned determines its storage method and the effect of recovery from memory. The establishment of the learning transfer effect in cognitive theory lies in the emphasis on knowledge There should be specific application methods in different situations.

Lifelong learning and Empowering

Huang (2008) believes that senior learning has four purposes, namely, strengthening physical and mental health and promoting health; providing knowledge and skills required for new roles; enriching life and spiritual connotation, improving life satisfaction; enhancing self-growth and experiencing the meaning and value of life. wait. Vichitvanichphong et al. (2018) pointed out that assistive technology in elderly care is divided into two categories: supportive and enabling. Supportive refers to helping the elderly carry out daily activities, that is, providing functions, abilities and characteristics; and enabling refers to Helping the elderly maintain their abilities by assisting with exercise or education and training, allowing a direct connection between the user (elderly) and the functions brought about by technological improvements. Wu (1999) pointed out that the more the elderly participate in the community and learn more, the better they adapt to life; functionalities are the technical capabilities to help the elderly meet their needs, that is, the appropriateness of technological aids. Berkman (2000) research showed that participation in social activities can provide the elderly with effective interaction, communication and mutual support, thereby providing stimulation to protect cognitive functions and thereby reduce cognitive deterioration of the elderly.

The quality of training and the technical support it incorporates are indispensable for the elderly to learn technological tools. Wilkowska and Ziefle (2009) research shows that training can significantly increase the use of mobile phones by the elderly; Barnard et al. (2013) It is pointed out that the quality of training, the design of teaching materials used, the ease of use of teaching aids or assistive aids, etc., all have a positive impact on cognitive usefulness, and accordingly affect the use of touch computers or mobile phones by the elderly; Marzano and Lubkina (2017) found that encouraging the elderly to use technology integration program products and providing continuous technical support and convenience increased the elderly's willingness to use mobile phones. Regarding the learning and use of digital technology tools, Barnard et al. (2013) found that older people with experience in learning new things showed a better attitude towards the use of assistive walking technology and gave advice to their peers. Aula (2005) studied how older people learn to use the Internet, especially search engines, and found that older people who are confident in using technology will have a better learning attitude towards learning and using technology.

Study Framework and Methodology

This study uses Vichitvanichphong et al. (2018) to believe that the adoption of assistive technology by the elderly is complicated by multiple factors. The results of the study divide 47 distinguishable determinants into individual, psychological, technology, environmental, intervention, support and training, etc. The 6 major factors are summarized in the following table in this study:

Table 3 Antecedents of assistive technology adoption among older adults

Factor (Item)	Determining Factors	Links to technical learning outcomes	This study was performed
Individual (10)	Innovation ability	+	• The elderly who lives alone with high innovation ability, technology learnability, education background and high-income level are the primary target customers of this study's science and technology education program. • Implement different teaching designs and arrangements for elders at different learning stages due to different learning preparatory levels in technology learning. • Discover and make good use of innovators and allow them to be used freely and ask for feedback on their use. • Investigate early adopters' perceptions of the application, observe how the early public uses it in their lives, and develop incentives to encourage the late public to use it. Laggards need to exert a certain amount of moderate peer pressure.
	Technology learnability	+	
	Living alone	+	
	income level	+	
	Social isolation	-	
	Education background	+	
	Age	-	
	Physical fitness	+	
	Cognitive ability	+	
	Number of chronic diseases	+	
Psychological (17)	*Attitudinal factor*		• Although this organization is Christian-centered, it respects the different beliefs, backgrounds and values of seniors from different backgrounds. • It is planned to use observation method and questionnaire survey method to investigate
	Attitude towards learning	+	
	Attitude towards Technology	+	
	Technology anxiety	-	
	Intervention preference	+	
	Lack of interest	-	

Factor (Item)	Determining Factors	Links to technical learning outcomes	This study was performed
	Perception factor		17 factors of the elderly's learning attitude and learning effectiveness towards the application of technological concepts and tools.
	Awareness of independence	+	
	Quality of life impacts cognition	+	
	Cognitive utility	+	
	Cognitive ease of use	+	
	Risk perception	-	
	Awareness of enjoyment	+	
	Awareness of social skills	+	
	Value perception	+	
	Need awareness	+	
	Learning benefit awareness	+	
	Trustworthy perception	+	
	Self-efficacy perceptions	+	
Technology (8)	Complexity	-	• In order to reduce the anxiety of the elderly about technology learning, the eight elements are used as a reference for technology introduction and teaching; • The reliability of technology refers to providing the required functions within the expected period without any failures or problems that cannot be eliminated. • It is planned to use technological learning tools that meet the characteristics of low complexity, high reliability, visual interface design, high compatibility (extending the elderly's use experience), high friendliness, high modularity, and low learning cost.
	Reliability	+	
	Interface design	The simpler the more positive	
	Compatibility	+	
	Function	+	
	Feature	-	
	Aesthetics	+	
	Cost	-	
Environmental (4)	Social influence	+	• For the elderly, more emphasis will be placed on the social skills and collective participation of technological tools or knowledge; • In the evaluation of environmental factors, focus on the degree of influence of technology learning on the social influence and group participation of the elderly.
	Social contact influence	+	
	Evolution of technology use over time	+	
	Group participation	+	
Intervention (5)	Privacy considerations	-	Integrating technology education for the elderly to ensure better learning outcomes
	Safety consideration	-	
	Frequency	+	
	Lack of awareness	-	
	Observability of results	+	
Support &Training (3)	Train	+	• Design training methods that can increase older adults' use of technology; • Teaching materials and teaching aids: physical teaching, multi-teacher guidance, iPad, materials, manuals, competitions, etc.; • Assessment of learning effectiveness of technological tools. .
	Training quality	+	
	Continuous support	+	

Sources: Vichitvanichphong et al. (2018), From this research (2023)

The ability to innovate and try is the degree to which individuals are prepared or willing to try new technologies. Roger (1995) adopts the 5-stage theory of adopters, and different teaching designs and methods are applied to the elderly who are at different learning stages due to different learning preparatory levels. Arrangements include discovering and making good use of innovators and allowing them to use them freely and asking them to publish their experience of using them, investigating early adopters' perceptions of applications, observing how the early majority applies them in their lives, and developing incentives to encourage the late majority to use and lag behind. A certain amount of pressure is required. Yusif et al. (2016) believes that the obstacle to the elderly's use of technology is that when the elderly realize that their physical and cognitive abilities are gradually declining, it may reduce their ability to learn and apply technology. For example, the hand-eye coordination of the elderly causes frustration in using technology products and reduces the frequency of use. The elderly may also often forget the steps of use and are still unable to operate them completely even after repeated instruction. This will result in the failure to achieve learning goals in the process of technology education. factors.

The elderly's attitude towards death and the degree of worry will also affect the effectiveness of technology learning. Elderly people who are highly worried about death are expected to have a lower sense of participation in the changes in the things and environment around them. This study attempts to enhance the perceived usefulness of technological tools among such elders in order to enhance the elders' motivation to learn technology and indirectly reduce the depression caused by their worries about death. In addition, the purpose of this institution is based on Christian faith. To cultivate spiritual sentiments, through group activities, we provide groups such as gatherings (education, learning, friendship, dinner parties), leisure (visits, hiking, outings), tourism (taking buses and trains to various parts of the country), overseas sightseeing (traveling thousands of miles), etc. Life opportunities, serving the elderly, allowing the elderly to enjoy the joy of life.

Applying the rule of "easy knowledge but easy action" in the design of technology education for the elderly, elders who have learned technology and have been frustrated may have higher learning motivation and results in learning new technologies (Barnard et. al, 2013); Au and Enderwick (2000) defined an individual's attitude towards technology as a cognitive process. Avoid the perception that the elderly is forced to learn technology, and make technology learning an option rather than a necessity. This will prevent the elderly from becoming anxious about technology, causing learning to become ineffective and a source of stress. This will not only fail to improve the quality of life of the elderly, but will actually increase the older people have more sources of stress.

Conclusion and Suggestion

This study collaborates with the institution to introduce science and technology application planning courses as shown in the following table:

Table 4 Summary table of three stages of digital transformation

Project	Current mode	New solutions for technological elements	Purpose
Walking	Collect points for short-distance walking and redeem the points for gifts	• Combined with the pedometer function of a smart bracelet or smartphone, record walking information as the basis for activity records and incentive measures; • Collecting points for gifts to motivate motivation.	National health
Digital Learning Workshop on Storytelling with Video	• Opportunities for interactive chat only when participating in events. • Oral communication, LINE greetings, telephone contact.	• Based on the principle of one person, one story, combined with the digital learning partner youth silver-haired co-learning model, the students interview and assist the elderly who intend to leave a written record of the story through the form of a student partner, work-study or voluntary service. The digital record is stored and digitally Extended sharing of records in the form of e-books; • Incorporate digital editing courses to teach the elderly to learn more about story script recording, video presentation concepts, shooting, editing and other digital technology knowledge through practical operations, with the help of digital learning partners to help them complete the editing and production of short films. editing and production of short films.	• Interpersonal connection • Education study
Mobile 2.0	Teach the elderly how to use mobile phones	Provide practical APP suitable for elderly health management, communication and learning	• Interpersonal connection • Education study
On-the-spot visits to scientific and technological institutions	Domestic and foreign tourism	• Visit the public television ultra-high-definition post-production and editing center; • Visits to welfare and food companies to increase the elderly's direct contact and understanding of technological products that can improve the quality-of-life care.	Education study

Sources: From this research (2023)

As a measure for the organization to encourage regular exercise among the elderly, the organization encourages the elderly to take voluntary and regular walks around the organization's plaza two days a week. Digital technology elements are incorporated into this activity to teach the elderly about basic health using smartphones. Functions such as detection

and step counting enhance fun and willingness through competition. The "Digital Learning Workshop on Storytelling with Videos" mainly hopes to use the functionality of video editing software to expand the use of smart device software among seniors, add interesting ways to record their own lives and life experiences, and learn to participate in short video shooting and Use editing skills to create your own personal videos and add color to your life. It provides the elderly with the ability to create or interview other people's life stories using video editing software and with the assistance of editing professionals and digital learning partners to create multimedia videos on their own. The life stories can be recorded and stored in physical form. With the consent of the parties concerned, relevant press conferences will be held to encourage other elders and enhance communication opportunities among the elders. Through digital learning workshops, personal guidance from television personnel who are indirectly exposed to the elders' lives will be introduced, so that the elders can Those who are older will not be forgotten by the development of technology because they are getting older, but they can feel the power of technology and increase the way of communication with younger generations.

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