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The Positive and Negative Impact of an Intergenerational Digital Technology Education Programme on Younger People's Perceptions of Older Adults

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Abstract. In order to meet the technological needs of older adults, and ensure digital inclusion, it is important for digital technology designers to accurately assess and understand older adults' needs and requirements, free from the influence of societal assumptions of their capabilities. This study evaluated the impact of an intergenerational digital technology education programme on younger adults' stereotypes of older people. Using an experimental design, results show that compared to a control group, students taking part in the programme subsequently rated older adults as more friendly but less competent. Practical implications for developing intergenerational education programmes are discussed.

Keywords: Older Adults; Attitudes; Stereotypes; Digital Technology; Intergenerational Education Programmes;

1 Introduction

Although digital technologies have become all pervasive in our increasingly connected digital society, many older adults, aged 65 and above, remain digitally excluded or digitally dismissive; this is despite the general acknowledgement that the internet is important and will become a 'way of life' for more and more people [1]. According to the 2015 report by Foresight, UK Government Office for Science, the rise of digital technologies has been 'a double-edged sword for older people' [2]. On the one hand, digital technologies provide access to local resources and services which national authorities, local authorities and businesses increasingly make available online only. On the other hand, several key barriers to successful engagement with technologies still exist: a lack of understanding and confidence in how digital technologies work, a lack of skills to make the best use of available resources, and the affordability of technologies. Some studies also highlight the fact that digital technologies are not being adopted more widely by the older generation because of a lack of perceived usefulness [3], [4]. This has significant implications for the design community, in particular young digital technology designers, both in terms of technologies they will be designing in the future and the design methods at their disposal which could be used to design digital solutions for those who are not particularly interested in the outcome [4].

There are social, economic and moral reasons for ensuring technology is appropriately designed for use by older adults [5]. Firstly, it is important that technology is usable by, and accessible to, older adults. Technology is an important tool to support older adults' independence, allowing them to live in their own homes for longer, therefore postponing or avoiding a need for residential social care. Secondly, increasing numbers of active older adults have more free time, therefore offering the technology industry lucrative new product development opportunities. Lastly, moral obligation and legislation (UK Disability Discrimination Act, 1995, and more recently the Equality Act 2010) require that systems are accessible to people with disabilities, who are in many cases older adults. Although technology design often adopts a 'user-centered' approach, it is argued that young designers may find it easier to design technology for a user more similar to themselves and experience difficulties understanding the potential impact of technology on the day-to-day lives of older adults [6]. This gap in understanding can lead to the design of technology based on designers', sometimes patronising, interpretation of older adults needs [5].

The young generation of millennials, which relies on instant communication, social networking, sharing of digital information and informal and rapid connectivity, differs from the older generation in their attitudes towards, purpose for and use of digital technologies. Therefore, there is a need for young digital technology designers to be able to examine and engage with viewpoints of the users of digital technology that they will be designing in future, including older users. Educators are presented with a particular challenge: how to design intergenerational education programmes which help to convey the diverse life experiences and expectations of older users to the technologically literate young generation who are very comfortable with everyday use of digital technologies, but who may lack the understanding of digitally disengaged or digitally dismissive users [7].

1.1 Stereotypes of Older People

Across many western cultures old age is perceived as a time of illness, frailty and dependency [16], [17]. Such prevalent negative age stereotypes can have a detrimental effect on the treatment older adults receive. For example, older workers often experience discrimination in the workplace [18], [19], which can be linked to negative stereotypes such as a lower aptitude to learn, less flexibility and a resistance to change [20]. However, older adults can also be stereotyped positively and can be seen as more moral and wiser than younger adults [21], [22].

These mixed positive and negative representations of older adults can be captured by the stereotype content model [23] which proposes that people from all social groups are evaluated along two independent dimensions: warmth (or friendliness) and competence. Older adults are viewed as warm (positively stereotyped) but incompetent (negatively stereotyped), resulting in a generalised view that they are 'doddering but dear' [24]. This mixed stereotype can result in patronizing, benevolent

attitudes and behaviours towards older adults [23] and, in some cases, lead older adults to confirm and internalize negative age stereotypes [25], [26]. One method of reducing stereotyped views of older adults is via increased social contact between generations [27].

Older adults are negatively stereotyped about their ability to interact with new technology [28]. A study invited participants (aged 18 to 72 years old) to rate the skills and abilities perceived as typical of either adults in their 20s or their 60s. Stereotypes rated as typical of younger, but not older adults included learning new skills, using new computer technology (e.g. smartphones), and using social media (e.g. Facebook). Age stereotypes of this nature are likely to hinder the development of technology required by older adults, and may also be strengthened during intergenerational programmes that focus on technology design.

1.2. Intergenerational Education Programmes

For students whose future career may involve addressing the needs of older adults, many educational courses employ intergenerational teaching strategies to provide education and positive intergenerational contact experiences, which also have a positive effect on attitudes towards older adults [8]. Interest in intergenerational programmes which bring together the older population and younger generation with an aim to share experiences, educate, support and engage with each other in the context of digital technologies has been growing steadily in recent years. In 2015 Kaplan et al conducted a survey of intergenerational technology-focused programmes, which considered the conceptual and practical applications of connecting younger and older generations in the technological domain [9]. Tentative conclusions from this preliminary study indicate that technology can be seen as a powerful tool for intergenerational collaboration and that an increase in digital inclusion may lead to a decrease in social isolation and exclusion.

Intergenerational programmes can bring younger and older people together resulting in positive outcomes. A review of intergenerational case studies across the United Kingdom led by the Beth Johnson Foundation documented a network of over 850 organisations and practitioners who are actively involved in delivering intergenerational programmes [10]. Specifically, studies of intergenerational programmes in education (including technology) generally point to a positive impact such programmes have had on the participants, such as fostering more positive attitudes toward older adults [11]; improving older people's sense of self-worth, health and well-being [12]; improving classroom atmosphere [13], and a higher overall level of social integration [14].

However, a study of intergenerational programmes in Ireland found that while such programmes attract a wide variety of organisations, including public, private and non-for-profit bodies and involve

participants from different generations, there is a need to better understand intergenerational practice and involve research institutions in their evaluation [15]. Importantly, one potential drawback of such programmes, particularly those that focus on tasks or areas where older adults are less skilled, is that they run a risk of reinforcing negative age stereotypes by focusing on areas where adults need help, thus they could unintentionally reinforce the impression of older people as incompetent - digital technology is one such context.

1.3 Digital Technology as a Negatively Stereotyped Context

Research shows that intergenerational contact reduces negative attitudes and stereotypes about older adults [29], [30], [31], [32]; including the stereotype that older adults are incompetent [33]. However, it is possible that when the task or context of intergenerational contact highlights or confirms negative old age stereotypes, especially those around dependency or incompetence, this may increase rather than decrease stereotypes in this area. Little is known about the effects of intergenerational contact in negatively stereotyped contexts, such as digital technology. Identification of effective training programmes for technology design for older users is essential, and robust evaluation of the impact of such programmes is critical, including their impact on stereotypes of older people.

2 Study Aims

The aim of this study is to evaluate an intergenerational education programme for digital technology students by assessing the degree to which it impacts students' stereotypes of older adults. Whilst contact with older people should improve the participants' perceptions of older adults as friendly, this type of intervention, in a domain where older adults are stereotyped as less competent, risks an increase in the young adults' perceptions of older adults as incompetent.

2.1 Hypothesis

It is hypothesised that compared to a control group who did not take part in the intergenerational education programme, experimental participants who interact with older adults in the negatively stereotyped context will report higher warmth stereotype ratings of older adults but lower competency stereotype ratings.

2.2 Methods

Participants

Participants were eighty-four digital technology students at a University in South East England. The average age of the students was $M_{\text{age}} 20.42$ ($SD=2.87$). Thirty-nine were males, thirty females and fifteen did not indicate their gender. All participants voluntarily completed paper questionnaires in class. Fifty-one participants had taken part in the intergenerational programme (intervention condition). This consisted of two intergenerational informal but loosely structured conversations, focusing on technology, and was completed as part of their coursework. Thirty-three participants that had not taken the coursework module formed the control group. The data were collected from two waves of the module that was repeated over two consecutive academic years. The final sample consisted of twenty-nine participants from the 1st wave (2014/2015) and fifty-five participants from the 2nd wave (2015/2016). The average age of older adults that took part as conversation partners was 71.52 years old, 41% were male, 45% were female and the gender of 14% of older participants was not identified.

2.3 Design and Procedure

An experimental design was used in which the independent variable was intergenerational contact. Participants were either in the experimental group that experienced contact with older adults as part of the programme or a control group that did not take part in the programme. The dependent variables were stereotypes; warmth and competence.

Participants in the experimental group were instructed to conduct two independent informal guided conversations with an older adult, either face-to-face or via SKYPE. The aim of the conversation was to build rapport with the older adults, share each other's experience of using technology, and identify potential barriers and frustrations. The students recorded and transcribed the conversations, then conducted analysis as instructed by the coursework brief. Both the guidelines for the conversation and the analysis featured focus on variables that had previously been identified as important moderators or facilitators of the successful effects of intergenerational contact on reduced ageism [27]. These conversations therefore focused on the following aspects: common goals, cooperation, institutional support, equal status, good quality contact, self-disclosure, story-telling, shared humour, avoiding incompetency stereotypes, challenging stereotypes, empathy, perspective taking and common in-group identities. Having conducted the conversations, the experimental group submitted their coursework via a Virtual Learning Environment (VLE), after which all participants responded to the stereotype measures.

The participants were informed that participation was voluntary, anonymous and did not form part of their coursework. Full ethical approval for the study was sought and granted.

2.4 Measures

Normative age stereotypes.

In order to measure respondents' awareness of commonly held perceptions of older people participants were asked "What does society in general think of older adults? As viewed by society....." followed by seven items "How competent/confident/ independent/competitive/warm/good natured/sincere are older adults?" on a 7-point scale (1 = not at all, 7 = very much).

Maximum likelihood confirmatory factor analysis was conducted in SPSS to explore the warmth and competence components of the age stereotype measure. This resulted in two factors with an eigenvalue above 1. Together the factors accounted for 60.6% of the variance and a varimax orthogonal rotation showed all items loaded onto one of the two factors, accounting to 31.2% (warmth) and 29.5% (competency) respectively. A chi-square goodness of fit test was non-significant $\chi^2(8) = 5.82, p = .668$, indicating the factors are independent of each other. A rotated matrix showing the factor loadings of the items are displayed in Table 1. Items were averaged to create two indices of warmth stereotypes and competence stereotypes.

Table 1. Varimax rotated factor matrix for stereotype warmth and competence factors.

Items	Factor	
	Warmth	Competence
Competent		.89
Confident		.58
Independent		.50
Competitive		.41
Good natured	.82	
Warm	.74	
Sincere	.74	
Cronbach's alpha	.81	.67

2.5 Results

Descriptive statistics.

To examine whether participants rated older adults as warm or competent one-sample t tests were conducted comparing the mean values to the midpoint (3.5) of the scale responses. The results showed that participants rated older adults as both warm ($M = 4.97$, $SD = 0.96$) $t(83) = 13.96$, $p < .001$, and ($M = 3.88$, $SD = 0.99$) competent $t(83) = 3.47$, $p = .001$. A paired sample t test was computed to examine the difference in ratings of warmth and competence, revealing that the participants rated older adults as higher in warmth ($M = 4.97$, $SD = 0.96$) than competence ($M = 3.88$, $SD = 0.99$), $t(83) = -7.31$, $p < .001$. Warmth and competence ratings were uncorrelated $r = .02$, $p = .870$.

Inferential statistics.

To examine attitudinal differences between the experimental and control conditions independent sample t tests were conducted. The experimental group reported higher ratings of warmth stereotypes ($M = 5.18$, $SD = 1.01$) than the control group ($M = 4.64$, $SD = 0.80$), $t(82) = -2.61$, $p = .011$, $d = .59$ and lower ratings of competence stereotypes ($M = 3.69$, $SD = 0.94$) than the control group ($M = 4.16$, $SD = 1.01$), $t(82) = 2.20$, $p = .031$, $d = .48$. Therefore, in line with the study hypotheses, participants who had taken part in the course reported more warmth stereotypes, and less competence stereotypes towards older adults compared to the control group.

3 Discussion

Our study found that compared with the students who did not participate, those students who took part in the intergenerational education programme, in which they conducted conversations with older adults about technology use, subsequently rated older adults higher on warmth (friendliness) stereotypes but lower on competence stereotypes¹. This suggests that as a result of the programme, students perceived older adults as more friendly but less competent.

The findings are consistent with research showing that intergenerational contact [29] and intergenerational programmes [27], [10] can have a positive impact on impressions of older people. In the case of the current research, an intergenerational education programme boosted perceptions of older people as being 'warm', thus confirming a commonly held positive age stereotype [24]. However,

¹ Participants' age, gender and prior contact with older adults was also measured and analysed. The results showed that these variables had no relation to participants' stereotypes of older adults and therefore could not be responsible for effects on the outcome of the programme.

finding that the intergenerational programme increased perceptions of older adults as incompetent, is divergent from other intergenerational contact literature. Tasipoulou and Abrams' analysis of national survey data showed that the more friendships young adults had with older adults the less they agreed that competence declines with age [34]. Findings from the current study however, suggest that in contexts where negative age stereotypes of older adults [31] are salient, or when older adults confirm negative stereotypes about competence, this has a detrimental effect on perceptions of older adults' competence. Therefore, intergenerational contact in these situations exacerbates the already negative societal stereotype of older adults' capabilities [24]. It is noteworthy that students' perceptions of warmth and competence in the current study are not correlated. This demonstrates that the same intergenerational contact experience has independent effects of two outcomes that vary in favourability. This finding is divergent from other intergenerational contact research, which shows an overall positive effect on positive and negative stereotypes [30], [31], [32].

In summary, the findings point to a potential pitfall of some intergenerational education programmes: when the focus is on an area of weakness for older people, such as digital technology, programmes run the risk of strengthening negative stereotypes of older people as being incompetent [24]. Future intergenerational contact research should compare programmes that vary only in the degree to which they highlight negative stereotypes in order to isolate and confirm these effects.

A psychological process that may have contributed to negative effects of the current intergenerational education programme, and others that highlight negative age stereotypes, is that the older adults themselves may have responded to the stereotype. It is possible that discussing technology with a younger adult could have induced a stereotype threat in the older adults. Stereotype threat occurs when an individual is anxious they may confirm a negative stereotype about their social group in a situation linked to that stereotype, and subsequently underperform on the stereotype relevant task [35]. Research shows that both explicit and subtle cues about negative age stereotypes are sufficient to have a detrimental effect on older adults' cognitive and physical performance [25]. In this case, discussing technology with younger adults may have implicitly highlighted the stereotype that older adults are viewed as poor technology users compared to younger adults, resulting in anxiety and less confidence in engaging with the subject.

4 Limitations

The research has some limitations that may impact on the conclusions that can be derived from the current findings. In particular, the number of competence-related items and warmth-related items was unbalanced, which could have led to biasing effects. However, because an average score was used in all analyses, such a biasing effect is unlikely. Additionally, a higher number of participants would improve the robustness of this study. However, because the hypothesis was based on a well-supported theory [37] and reliable measures were employed we are confident in our findings and outcomes.

5 Practical Implications for Educators

In order to include older adults in a society with rapidly changing technology and increase their use of technology it is important that technology is designed with their needs in mind. However, the present research highlights that focusing on these needs presents a problem. On the one hand, the findings demonstrate how intergenerational contact in technology-learning programmes can have a positive effect on perceptions of older adults' friendliness, yet have a negative impact on perceptions of their competence.

Future intergenerational education programmes should aim to counterbalance the detrimental effects of intergenerational contact within negatively stereotyped contexts. For example, experimental research in which young adults collaborated with older adults on tasks at which older adults are stereotypically more proficient, resulted in those young adults being more pro-social in their attitudes and behaviours compared with young adults working on other tasks, or with younger partners [38]. Further studies should examine if highlighting older adults' abilities mitigate the detrimental effects of intergenerational contact in negatively stereotyped contexts.

The results highlight that it is important to be aware that user-centered design strategies involving intergenerational contact (e.g. conversations or interviews) have the potential to increase incompetence perceptions of older adults. In turn, this may hamper young designers' abilities to create technology that fully meets the needs of older adults, by encouraging patronising assumptions of older adults' interaction with, and needs for, technology [5].

These findings underscore the importance of evaluating intergenerational education programmes, as suggested by Finn & Scharf [15]. Comparing outcomes of programme groups to control groups is an important design aspect that helps identify effects attributable directly to the programme. For a review of best practice for intergenerational programmes see [28].

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