

Promoting older adults' well-being through Internet training and use

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Abstract

The purpose of the current research was to test the psychological impact of learning how to use computers and the Internet in old age, hypothesizing that such activities would contribute to seniors' well-being and personal sense of empowerment. Employing a quasi-experimental research design, we offered a course, conducted in small groups, in computer operation and Internet browsing to 22 older adults (mean age of 80) who went to day-care centers for the elderly or resided in nursing homes. A comparison group of 26 participants (similar in all major respects) was engaged in other activities. Both groups were administered measures of physical functioning, life satisfaction, depression, loneliness and self-control at pre- and post-intervention four months later. Individual semi-structured interviews were conducted with participants who finished the computer course. ANCOVA was employed for controlling the effects of control variables and pre-intervention differences on participants who completed the activities. Results showed a significant improvement among participants in the intervention group in all measures except physical functioning, whereas deterioration in all measures was detected in the comparison group. Computer and Internet use seems to contribute to older adults' well-being and sense of empowerment by affecting their interpersonal interactions, promoting their cognitive functioning and contributing to their experience of control and independence.

Introduction

Aging is often accompanied by various physical and mental problems including deteriorating health and cognitive functioning. These changes contribute to the development of depression and anxiety disorders associated with social withdrawal, dependency and suicide (Levy Cushman, McBride, & Abeles, 1999), feelings of isolation and loneliness, fears of death, reduced social ties and a loss of one's regular social network and support group (Butler, Lewis, & Sunderland, 1998). A central aspect of these phenomena is the feeling of *powerlessness*, a subjective experience caused by mental and physical stress, the loss of economic security, deterioration in the ability to influence and to make a social or political difference, greater dependency on others and increasingly negative attitudes in society toward old age (Cox, 1988).

The Internet has become an accepted, routine means of communication for many people, including older people (Bargh & McKenna, 2004; Pew Internet & American Life Project, 2005). In addition, the Internet has created new opportunities for people in distress when traditional resources are unreachable or unattainable or require special effort. These opportunities include online therapy and counseling (Barak, 2004), online support groups

(Meier, 2004) and health-related information (Cline & Haynes, 2001). Several unique characteristics of computers and the Internet can enhance the quality of life of older people. For instance, Internet-based communication with other people is convenient and affordable, thus enabling social needs to be met more easily and directly. Involvement in various types of online social or political activism can contribute to feelings of self-worth. Retrieval of medical or mental health information, which is of special value to many seniors, can promote self-confidence and help reduce anxiety. Online shopping, banking, gaming, donating and learning are effective ways to overcome physical handicaps. Overall, then, it seems that the use of computers and the Internet can empower older people, contribute to their quality of life and help in coping with this group's typical mental and physical difficulties. Aging might then become less difficult as older people gain greater opportunities to be more independent, less socially isolated and more cheerful.

As Internet surfing is a relatively new phenomenon, the proportion of older people who indulge in this activity is small compared to younger generations. In the US, for instance, a survey

conducted in 2004 found that 22% of people aged 65 and over used the Internet, compared to 58% of those aged 50–64, and 75% of those aged 18–49 (Pew Internet & American Life, 2004). This survey also showed that older people who had the necessary equipment and skills were usually as capable and as motivated to use the Internet as were younger individuals and used the Net for a variety of purposes, including communicating through e-mail, investigating family trees, healthcare purposes and even cybersex. As Campbell (2004) found, however, differences exist among older people in their use of the Net and these are usually related to age; it seemed that the very old were less capable of using computers and several Web applications effectively due to inappropriate website usability, design of computer equipment or the unsuitable or unfocused content of many websites. Yet, older people are able to learn to use computers and Internet browsing effectively with appropriate training (Dauz, Moore, Smith, Puno, & Schaag, 2004); their confidence and ease of use of these technologies are proportional to actual practice (Adams, Stubbs, & Woods, 2005) and they usually are enthusiastic about learning computer technologies (Gietzelt, 2001).

In focusing on the ability of the Internet to meet the needs of the elderly, Henke (1999) highlighted services and applications—such as online shopping, money management, health education and social, political and spiritual involvement—that directly contributed to older people's independence. Wright (2000) examined the effects of older people's participation in online support groups and online communities and argued that high degree of participation in these activities contributed to social relationships as well as to increasing this population's direct action in coping with difficulties. Employing a survey of elderly Internet users, McMellon and Schiffman (2002) showed that involvement in various online behaviors and activities contributed to older people's gains in personal control and empowerment. Chen and Persson (2002) found that Internet use among older people tended to be associated with greater sense of well-being, contrary to the then-claimed negative relationship between Internet usage and several psychological factors. More recently, Karavidas, Lim, and Katsikas (2005) found a positive relationship between older people's use and knowledge of computers and the Internet and their general self-efficacy and life satisfaction. In summary, it seems that the functional use of computers and Internet is positively related to older people's well-being.

Several studies investigated the effects of intervention programs aimed at educating older people to use computers and the Internet. Cody, Dunn, Hoppin, and Wendt (1999) found that a training program in Internet browsing increased older people's perceived social support and made their

attitudes toward aging more positive. White et al. (1999), after developing a training program for the elderly in the use of computers and the Internet, reported that participants demonstrated a significant reduction in social isolation several months following the program, compared to a no-treatment comparison group, which did not change in this respect. Straka and Clark (2000) developed a nine-week workshop to train frail older seniors (mean age 85 years) in computers and Internet use. They found that six months after the workshop had ended, and with ongoing technical support by volunteers, most participants reported improvement with various factors related to their well-being and empowerment (e.g. sense of mastery and achievement). White et al. (2002) used a randomized control trial design with older people in providing an intervention group with nine hours of training in using computers and Internet over two weeks and followed them up after five months. The researchers found a trend toward a positive psychological impact in comparison with the waiting-list control group, though the impact of the intervention was marginal.

The objective of the current study was to test the psychological effects of a tailored educational intervention offered to older people in computer and Internet-usage skills and the promotion of their actual use. Prior studies cited above either did not use a comparison-control group (Cody et al., 1999; Straka & Clark, 2000) or used a no-treatment control group rather than an alternative activity control (White et al., 1999; White et al., 2002). To overcome these limitations, the present study employed a quasi-experimental design in a field setting, in which an intervention group based on computer-education and Internet use was compared to a control group receiving an intervention not related to computer use. In addition, the present study examined the effects on a broader spectrum of psychological factors related to well-being and empowerment, including feelings of loneliness, a sense of control over one's life, depression and life satisfaction.

Methods

Participants

The study was carried out in Israel with Hebrew-speaking participants. Twenty-two older people, nine men and 13 women, aged 70–93 ($M = 80.25$; $SD = 6.50$), were included in the intervention group. These participants had an average of 11.43 years of education ($SD = 3.43$) and had been retired for 17 years on average ($SD = 10.10$). Two of them were bachelors, seven were married, two were divorced and 11 were widows. Twenty-six other older people, nine men and 17 women, aged 70–93 ($M = 82.60$; $SD = 5.90$) were included in a comparison group. These other participants had an average of 10.31

(SD = 3.74) years of education and had been retired for 17.47 years (SD = 7.84). None of them was a bachelor, three were married, two were divorced and 21 were widows. As can be seen from these data, the two samples were relatively similar in relevant variables. Participants were involved in three day centers for the elderly or resided in two nursing homes. The activities given the two groups were carried out at separate locations in order to avoid the existence of two activities in the same setting to preclude the possible leaking of information, which then might have created motivational contamination of the research. Participation in the activities as well as in the research was on a voluntary basis. Participants were assigned to computer-education intervention or to the comparison group based on their willingness to participate and interest in the different activities. This procedure enhanced ecological validity, as assigning participants to activities is standard in natural settings, therefore better generalization of research findings to reality is possible. Also, by allowing freedom of choice participants did not have to engage in activities against their will, therefore greater cooperation and learning could be reached. The only inclusion criterion referred to sufficient cognitive capability (as reported by permanent sites' staff who knew participants closely) to participate in the offered activity.

Nine participants (six from the intervention group and three from the comparison group) dropped out of the program, leaving an actual group size of 16 and 23, respectively, in the intervention group and in the comparison group. Reasons for dropping out were death, moving, traveling abroad, medical problems and unwillingness to be interviewed. There was no systematic difference in any meaningful variable (e.g. age, gender) in either group among participants who stayed on or who dropped out of the research.

Intervention

Computer operation and Internet use. The participants in the intervention group took part in an educational program that was aimed at equipping them with skills for operating a personal computer and using several Internet applications, including handling e-mail, browsing the Web and exploiting different types of sites and participating in forums and virtual communities. The teaching was carried out in specially dedicated rooms in which several computers were hooked up to the Internet through ADSL. Participants were encouraged to use the computers and the Internet as much as they liked in between training sessions and they actually did so in their free time. The instructors, veteran teachers in the use of computers and Internet, were especially experienced in working with older people. They were assisted by volunteers, who provided participants with additional help and guidance when needed.

The program lasted 15 weeks and included one or two lessons per week, each approximately 60 minutes long.

Alternative activities. The participants in the comparison group took part in one or more of several activities offered to them in the respective settings with which they were involved. These activities, which included courses in painting, sewing and needlework and ceramics, were typical for elderly people. Length of time of involvement in each activity, as well as availability and attention given to participants by the instructors, was similar to the computer-intervention group. Participants took part in weekly or bi-weekly classes and practiced the activities on their free time in between classes. These courses, too, lasted approximately 15 weeks.

Instruments

Demographic questionnaire. This questionnaire asked for participants' biographic personal details, such as age, marital status and education. Participants were also asked about other relevant details, such as computer experience and recent negative life-events.

Difficulties in physical functioning scale (DPFS). Based on items included in questionnaires developed by Parkerson et al. (1981) and Zung (1965), this questionnaire examined participants' physical health. Participants were asked to rate, on 3-point scales, their difficulties related to 13 areas (e.g. breathing, headaches, fever, weight loss or gain). An additional four 3-point-scale items referred to physical health-related behaviors, such as frequency of visits to a physician. A total score in the range from 17 to 51 was computed by adding up all 17 items. Cronbach alpha coefficient of the questionnaire when administered prior to the program was 0.78.

Life-satisfaction scale (LSS). This instrument is an adaptation of Back and Guptill's (1966) questionnaire designed to measure the level of life satisfaction in older people. The present scale included seven 5-point, bipolar items, such as 'my life is: interesting-boring; hopeful-hopeless'. A total score, ranging from 7-35, was computed by adding up all items. Cronbach alpha coefficient of the scale when administered prior to the program was 0.87.

Depressive adjective checklist (DACL). This questionnaire, based on Lubin's (1966; 1981) instrument, is designed to measure depressive moods in older adults. The instrument contains 34 adjectives (e.g. unhappy, lonely, friendly, free), according to which participants were asked to describe themselves on the day they filled out the forms. Lomranz, Lubin, Eyal, and Joffe (1991) had reported a

Cronbach alpha coefficient of 0.84 and a significant correlation with other measures of depression. The Cronbach alpha coefficient found for this questionnaire in the present study was 0.91.

Revised UCLA loneliness scale (UCLALS). The questionnaire was developed by Russell, Peplau, and Cutrona (1980) to assess subjective feelings of loneliness or social isolation. Participants responded on a 4-point scale to 20 statements (e.g. 'I miss the pleasure of the company of others'). Total scores ranged from 20 (low loneliness) to 80 (high loneliness). Cronbach alpha coefficient found in the present study was 0.88.

Self-anchoring scale (SAS). This instrument (Cantril, 1965) consisted of a vertical scale, from 0–10, on which participants marked the degree of satisfaction with their lives at three points in time: currently, five years ago and, as an estimate, in five years time. In the present research, participants were asked to refer only to their current feelings. Several studies have supported the reliability and validity of this measure (Diener, Emmons, Larsen, & Griffin, 1985; Larsen, Diener, & Emmons, 1985).

Perceived control scale (PCS). This scale consists of the 'perceived control' factor found in a study on coping (Pearlin & Schooler, 1978). It contains seven statements (e.g. 'What happens to me in the future is dependent mainly on me'), on which participants were asked to rate the degree of their agreement on a 4-point scale. Scores from adding up the items ranged from 7–28. The scale has been found to be reliable and valid (Becker et al., 2001; Lomratz et al., 1991). In the current research, the Cronbach alpha coefficient was 0.67.

Procedure

The project started once the computer and Internet training course and the research matters were coordinated with the managers of the nursing homes and day care centers. In the first stage, pre-intervention data were collected from the participants in both groups for pre-treatment assessment. This was done by one of two experimenters in individual meetings with each participant. The participants received a copy of each questionnaire and, if necessary, were assisted in filling them out. In several cases, instructions and items were read to participants who gave their responses orally and these were recorded by the experimenter.

The interventions lasted approximately 15 weeks. Upon completion of the respective activities, the participants were contacted and individual appointments were scheduled for the second administration of the measures, by the same experimenters, for post-treatment assessment. The second administration was conducted 2–4 weeks after the end of the computer or alternative intervention and conducted in the two groups in parallel.

Results

Table I presents descriptive statistics for the experimental treatment and the comparison groups at the two times of measurements, both unadjusted and adjusted for pre-treatment scores. Three measures (DPFS, DACL, UCLALS) were scored in a negative direction (lower score indicates better functioning) while three measures (LSS, PCA, SAS) were scored in a positive direction (a higher score indicates better functioning). Looking at the unadjusted data, the Internet group changed from pre- to post-treatment in a direction consistent with the research hypothesis on all six variables: scores showed lower levels of physical difficulties (DPFS), depression (DACL)

Table I. Comparison of means and standard deviations of the dependent measures by group and time of measurement: Unadjusted pre- ($n = 39$) and post- ($n = 37$) measurements and adjusted post-measurements ($n = 37$) corrected for control and pre-intervention differences.

Measure group		DPFS	DACL	UCLALS	LSS	PCS	SAS
Unadjusted							
Intervention	Pre M	30.00	11.75	42.56	21.75	15.62	6.13
	SD	6.07	7.69	12.32	7.44	3.91	2.47
	Post M	26.46	8.88	35.51	24.88	19.19	6.38
	SD	4.08	7.20	11.27	6.79	3.82	2.22
Comparison	Pre M	24.61	6.76	38.16	21.19	18.45	5.48
	SD	4.14	6.02	11.51	6.64	3.81	2.00
	Post M	26.67	12.62	46.71	15.05	16.10	4.29
	SD	4.83	7.01	12.13	6.01	4.02	2.10
Adjusted post measures							
Intervention	M	25.41	7.04	32.88	24.81	19.99	6.06
	SE	1.00	1.50	1.84	1.18	0.87	0.44
Comparison	M	27.60	13.89	47.53	15.36	15.00	4.32
	SE	0.82	1.23	1.53	1.00	0.72	0.38

DPFS = Difficulties in physical functioning scale. DACL = Depressive adjective checklist. UCLALS = Revised UCLA loneliness scale. LSS = Life-satisfaction scale. PCS = Perceived control scale. SAS = Self-anchoring scale.

and feeling of loneliness (UCLALS) and improvement in life satisfaction (LSS), sense of control (PCS) and life quality (SAS). However, Table I also shows that the treatment and comparison groups differed in their pre-treatment measures, a finding that might be related to the quasi-experimental nature of the study. Thus, controlling pre-treatment scores was necessary to test the research hypotheses.

We also searched for a-priori differences between nursing home residents and day care users, to check possible moderating interactions with the dependents measures. In the treatment group, no significant differences were found on all six pre-treatment measures. In the comparison group, there was a significant difference only in physical functioning (DPFS): nursing home residents had significantly fewer physical problems than did day care users ($M = 20.80$; $SD = 1.64$ vs. $M = 27.04$, $SD = 5.30$, $t = 2.56$; $df = 21$; $p < 0.05$). Since this was the only a-priori difference between the two subgroups and since the nursing home residents subgroup was rather small ($n = 8$), we concluded that overall there were no significant differences between the two subgroups.

In addition, we examined Pearson correlations among the six measures, assessed before treatment, and ten key background variables: age, gender, years of education, occupational area, number of children, prior Internet experience, financial status, religiosity and number of negative and positive events last year. As some correlations could be found significant by chance when a large number of correlations (112) are computed, we used the 0.01 confidence level. Only two correlations were found to fit this criterion: between number of children and life satisfaction ($r = 0.47$) and between the number of positive events during the previous year and loneliness ($r = -0.45$).

Given the above findings, we performed a repeated-measures MANCOVA comparing the treatment and the comparison groups on the six dependent measures before and after the intervention, while controlling for the number of children and the number of positive life events, in addition to controlling for the pre-treatment group differences. Table II shows that, as expected, the interaction between the time x group factors, which relates to the hypothesized differential changes, was significant ($F = 9.96$; $df = 6:28$; $p < 0.001$; $\eta^2 = 0.68$). The lower part of Table I presents post-intervention means and standard errors of the six measures, *adjusted* for pre-intervention differences. Post-hoc

univariate ANOVAs (using the Bonferroni method) showed differences in the expected direction between the intervention and the comparison groups in five of the six measures: Higher levels of life satisfaction (LSS: $F = 39.94$; $df = 1:33$; $p < 0.001$; $\eta^2 = 0.55$); sense of control (PCS: $F = 13.22$; $df = 1:33$; $p < 0.001$; $\eta^2 = 0.29$) and life quality (SAS: $F = 7.42$; $df = 1:33$; $p < 0.01$; $\eta^2 = 0.18$) and significantly lower levels of depression (DACL: $F = 10.00$; $df = 1:33$; $p < 0.01$; $\eta^2 = 0.23$) and feeling of loneliness (UCLALS: $F = 34.71$; $df = 1:33$; $p < 0.001$; $\eta^2 = 0.51$). Only for physical difficulties (DPFS) the comparison was found to be not statistically significant ($F = 2.24$; $df = 1:33$; $\eta^2 = 0.06$).

Discussion

The aim of this study was to examine possible positive effects that the use of computers and the Internet might have on older adults. As hypothesized, elderly people who began using the Internet felt less depressed and lonely, more satisfied with life, more in control and more pleased with their current quality of life than did people who were engaged in other activities for the same period of time. Changes in difficulties with physical functioning, however, were not statistically significant following the intervention. In identifying these effects, the current research is an important addition to the cumulative knowledge on the possible effects of the use of the Internet and computers on the elderly. It should be noted that the conclusions of our research contradict the assertion of a recent comprehensive review by Dickinson and Gregor (2006) who found no consistent and validated effects of computer use by older people on well-being. However, we contend that the results of the current intervention study highlight the specific positive effects of the use of the Internet, on psychological distress in older users.

The improvement in well-being of the elderly participants with computer and Internet intervention is of special interest because we also identified deterioration in the well-being of those in the comparison group. Age-related deterioration over time in aspects related to well-being was identified in the past (e.g. Kunzmann, Little, & Smith, 2000), even in repeated measurements conducted over only several months time (Wolinsky, Wyrwich, Babu, Kroenke, & Tierney, 2003). It seems that computer and Internet use not only prevented this deterioration but even enhanced psychological factors important to the quality of life of older people. The reasons for this improved well-being might be related to psychological processes associated with experiences of personal empowerment, enhanced interpersonal communication, learning and overcoming physical

Table II. Results of MANCOVA on research measures, by group and time of measurement ($n = 37$).

Factor	<i>F</i>	<i>df</i>	<i>p</i>	η^2
Group	5.05	6:28	<0.01	0.52
Time of measurement	1.05	6:28	ns	0.18
Group x time	9.96	6:28	<0.001	0.68

difficulties related to mobility (e.g. Gal & Prisant, 2003; McMellon & Schiffman, 2002).

In an attempt to better identify and understand these dynamics, we analyzed follow-up interviews with participants in the computer intervention group, who were asked semi-structured questions regarding the process they had undergone. We identified four central factors repeatedly stressed by participants: *learning* of an innovative field; *social* benefits of using online communication; experiencing *involvement* and action; and *positive feelings* stimulated by using the Internet. First, in regard to learning an innovative area, the Internet was viewed by participants as a typical activity of young people, who like the new technology are characterized by (youthful) dynamics and speed. Using computers and the Internet in old age and receiving the cheerful feedback of people surrounding them made the participants feel proud of themselves, perhaps even a glimmer of returned youth. Second, participants pointed out that they had been encouraged to ask acquaintances for their e-mail addresses and had corresponded with them, as well as corresponded with the course instructor and one another; in doing so, they experienced the social benefits of enhanced interpersonal communication. A third important social benefit was using materials acquired online in a social context. Participants thus used stories, jokes and general information from online resources in a social context. In addition, browsing the Internet contributed to feelings of being constantly 'in' and updated, which elevated a personal sense of belonging. Fourth, participants reported the emergence of positive feelings while surfing the Web, caused by the variety of online activities they encountered, their consequent elevated self-image and experiences of motivation and enthusiasm. Specific emotions cited were general happiness, satisfaction and fun, a sense of control, experiencing success, mental stimulation and challenge. Especially with older adults, these emotional experiences should not be disregarded or underrated, as this population typically lacks challenge and experience a lack of activity and dependence (Cox, 1988).

Throughout the interviews, processes related to *empowerment*, either implicitly or explicitly, were quite evident. Participants said that the activities they had taken part in contributed to experiencing decision-making, critical thinking and equal access to resources—factors that Wallerstein (1992) identified as essential to empowering individuals. These factors also concur with Staples' (1990) view of personal empowerment as a process of personal growth, resulting from developing skills and abilities along with a more positive self-definition. One of the special characteristics of using computers and browsing the Internet is its individualistic and continuous nature—people may engage in it as

long and as flexibly as they wish, thus providing numerous opportunities to fit their needs and conditions. Unlike dancing, card games, lectures or sightseeing tours—which are limited to time, place, or presence of instructors and other participants—using computers is individualistic, time-flexible and entirely self-initiated. It seems that the improved well-being of the participants in the computer and Internet intervention not only made them experience an improved emotional state but also affected their basic self-image and self-confidence—personality agents that might have contributed to more general growth and social functioning.

Our research showed a significant effect on relevant psychological criteria from using computers and Internet, compared to alternative activities that elderly people took part in over a similar period of time. In addition to methodological considerations first used in this study, set to compensate for weaknesses of previous investigations, we showed that a relatively short and simple intervention could enhance the mental processes of people despite their old age. This notion is of special importance, as it is commonly assumed that older people might not be able to learn and apply new technologies. Actually, we were able to show that when older people have the willingness to engage in and the potential (as assessed by themselves) for computer activity, they can successfully employ this potential and achieve both direct goals (e.g. search for information, communicate with relatives) and indirect goals (e.g. a higher sense of control, decreased feelings of loneliness).

Moreover, as the study was conducted in Israel with Hebrew-speaking participants, we found that language was not a barrier despite the need to know basic English in order to operate computers and browse the Internet. This conclusion is similar to that of Straka and Clark (2000), who showed successful effects of learning and using the Internet among French-speaking participants in Québec. However, we have to bear in mind that using computers in old age does not suit everyone, as might be evident from the higher dropout rate of participants in the computers intervention group in comparison with the comparison group. This fact should be taken into account in inviting and screening seniors for such activities.

The findings reported here are based on a single and relatively small sample. Replication of results from additional samples and using alternative measures will contribute to better generalization. Our post-intervention measurement consisted of a single time observation; it would be of value to see whether the effects found here are sustained for a longer period of time. In fact, we informally followed participants from the computer intervention group for several months after the end of the study and found that, on their own, they continued to be highly involved in actively using the Internet.

Similarly, it would be important to examine additional, secondary effects of the intervention; that is, whether the significant changes in psychological factors detected here had further effects on older adults, such as on mortality, health-related criteria and social involvement and activism. Although we noted some differences before the course in computer experience by various participants in the intervention group, the sample was too small to examine the effects of this longer interaction or to offer differential interventions. This factor, however, might become more important to study in the future, as computer skills and experience become more prevalent in older adults. Likewise, possible personality differences existed between people who chose to participate in the computer and Internet education activity and others. This factor could be related to change, thus should be monitored and controlled in future research.

Another interesting and important aspect that should be elaborated in future research has to do with a closer examination of the dynamics of personal change prompted by computer and Internet use. As noted earlier, we speculated that several psychological processes were responsible for the observed changes known to contribute to anti-aging psychological deterioration, such as interpersonal communication and interaction (Bowling et al., 2003), elevated use of cognitive mechanisms (Dunning, 2004) and a growing sense of empowerment (McMellon & Schiffman, 2002). A closer investigation of these factors, using a mix of quantitative and qualitative methods, might offer a deeper understanding of the internal processes older people go through when they adopt computers and the Internet.

Preparing and applying computer and Internet intervention programs for the elderly require special attention to various factors characterizing this population. Therefore, care should be taken to develop educational means and technological specifications that best fit older people and specific individuals' characteristics. In addition, more general considerations must be attended to while involving older people with computers, such as friendlier computer interface and software design (White et al., 2002), improved usability and contents (Selwyn, 2004) as well as the physical environment where learning and computer usage take place (Namazi & McClintic, 2003). The improved practical considerations in combination with advanced technology might prove beneficial for older people's well-being.

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