

The effect of delivery method, speaker demographics, and physical environment on the engagement level of older adults

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Summary

With the rise of the older adult population worldwide and the rapid advancements in technology, it is becoming more important that senior citizens learn to use new technologies to remain active in society. To facilitate learning, technology-training programs should strive to capture and maintain a high level of engagement among older adults. In order to understand how to design effective technology-training programs, we examined the factors that affect the engagement of older adults as they learn to use technology. The first part of our study consisted of a survey that collected information about their preferences on various factors relating to learning engagement. Responders frequently indicated preferences for morning lessons in a familiar environment, often by teenage or older (over 50 years old) instructors, with a guided hands-on method. The second part of our study recorded the behavior of a group of older adults as they responded to different teaching delivery methods. The results indicated that an interactive lesson style was associated with a significantly higher level of engagement by participants. Older adults in interactive lessons asked more questions and retained course material at a higher rate than those subjected to video and written methods. In summary, these results suggest that many older adults prefer learning in the morning, in a familiar environment, by teenage or 50+ instructors, and with a guided hands-on method. Furthermore, an interactive learning method may increase engagement.

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Introduction

The older adult population (65+) is rapidly growing, comprising 11.7% of the world's population in 2013 and projected to reach 21.1% by 2050 (1). This demographic has continued to adopt new technologies, with percentages of technology usage among those 65+ increasing each year from 2000 (14%) to 2014 (59%) (2). Although older adults adopt technologies at a slower rate than their younger counterparts (3), older adults report using a wide variety of technologies in their homes and

for their health (4). Moreover, when prompted, older adults perceive many positive benefits of technology, including enhanced convenience and useful features (4).

Technology has the potential to benefit older adults in many ways, especially because it can help them stay connected to family and friends and support the management of their health and wellness (e.g., health tracking, chronic condition management) (5). Technology also provides access to information, such as community and national resources, allows for financial management from home, and can support memory (6). Technology may also help older adults reduce stress and increase the vitality of their mental capacities (7). Furthermore, technology has been used to deliver interventions to reduce symptoms related to dementia such as Alzheimer's disease (3). Despite the numerous benefits technology has the potential to offer older adults, stereotypes exist that may produce barriers to older adults adopting new technologies. Older adults are typically stereotyped in consumer rhetoric, and are often portrayed as lazy, confused, and uninformed consumers across many industries (8, 9, 10). This is especially prevalent in the technology space, as older adults are often stereotyped as being afraid of technology. In turn, these stereotypes have harmful effects on older adult consumer spending psychology (10). Seniors begin to feel isolated from the recent advances in technology and refrain from the purchase and further exploration of various devices (10).

Given the potential that technology has to offer older adults, it is important to understand how to increase their adoption and use of technology. Technology training programs may be able to improve technology use among older adults if they engage them and meet their needs and preferences. Many nonprofit organizations and corporate foundations are beginning to develop extensive technology training programs for older adults, including organizations like Technoacademy, Inc., a national nonprofit working to spread digital literacy.

One important aspect of a training program is how well the training engages the learner. Engagement can be defined as the physiological and psychophysiological responses to stimuli; a high engagement level can result in "progression that preserves the participant's attentional focus, minimizes attrition and maintains a prescribed level of energy exertion" (11). A higher level of engagement sharpens physiological and psychophysiological responses to learning stimuli and thus improves material retention (11). Factors that are likely to affect engagement include memory retention, vocabulary maintenance, and pattern recognition—

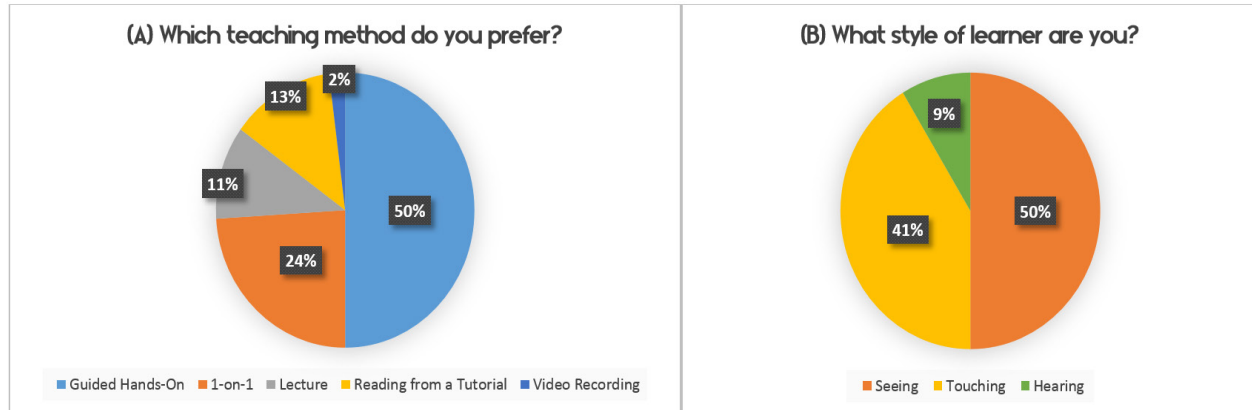


Figure 1: In (A) participants were asked which teaching method they preferred. “Guided Hands-On” and “1-on-1” were collapsed into the “Kinesthetic” category. “Lecture” and “Reading from a Tutorial” were collapsed into the “Visual” category. “Video Recording” was put into the “Auditory” category. In (B) participants were asked which type of learner they were. This question was meant to be a more streamlined version of the question in (A). All graphs contain responses from 46 participants.

which all tend to decline with age (12, 13, 14). This lower level of cognitive function is often attributed to physical rather than environmental factors, including decrements in the frontal processes (i.e. frontal lobe functioning) of aging older adults (15). In turn, this lower level of functioning could decrease the ability to remain engaged during teaching and training. These age-related declines may impact engagement level for older adults.

Training preferences are likely to be another important factor of a technology-training program. Research has shown that college-aged students have specific preferences for training characteristics. In one study, students most preferred a visual method, followed by audio and then kinesthetic. Other research found that a combination of all three styles (VARK) was preferable to any of the single styles (16). These preferences have not been examined among older adults.

In this study, the authors investigated different technology training methods to examine older adults’ preferences and discern which would facilitate the most engagement among older adults. Participants were recruited from a variety of different geographic and physical locations to increase the generalizability of our findings. Surveys were distributed to assess older adults’ attitudes about technology training, including their preferences for the physical environment, delivery methodology, and speaker demographics. Then, we investigated the level of engagement in response to various delivery methodologies. Engagement was measured by recording the number of people actively watching and the number of questions asked by the participants during a technology-training program.

Results

Survey

Surveys were distributed to 46 older adults (over 65 years of age). Out of the 46 people surveyed, 34.78% were male and 65.22% were female. The participants represented a range of geographical regions (65.22% from Georgia, 32.61% from New York, 2.17% from

Pennsylvania) and types of living situations (40% in assisted living, 60.87% independent living). Most (65.22%) participants owned a computer (desktop or laptop). A smaller majority (54.35%) owned a cell phone. No participants were engaged in a previous technology learning program.

We first examined delivery methodology (Figure 1). There were two notable questions that referenced different types of learning activity. The first question asked, “Which method do you find the most appealing to learn from?” (See Figure 1A for responses) which was intended to reference specific examples of common teaching/speaking methodologies. The most frequent preference for teaching method was “Guided Hands-On” (50.00%), and the next most frequent preference was 1-on-1 (23.91%). On the other hand, more visual-based and audio-based methods – such as Lecture (10.87%) and Reading from a Tutorial (13.04%) – were less preferred. The second question was “What type of learner do you characterize yourself as?” This question was intended to approach the variable of delivery methodology in a more general question (see Figure 1B for responses). Half of the participants characterized themselves as learning by “Seeing” (50.00%), and nearly half characterized themselves as learning by touching (43.48%). “Hearing” was infrequently chosen as a learning type (6.52%). All statistical analysis was manually developed with the help of Microsoft Excel’s SOLVER Tool Pack.

We next examined speaker demographics. A series of questions (Figure 2) were included to discern the preference of older adults for the age and other characteristics of the speaker. The respondents most frequently chose 50+ as the preferred age for speakers (30.43%) (Figure 2A). The next most favorable age group for speakers was teenagers (23.91%). Yet, there was a major discrepancy between seniors in assisted living and those living independently. Assisted living seniors preferred teenage speakers most frequently (46.67%), while independent living seniors preferred 50+ aged

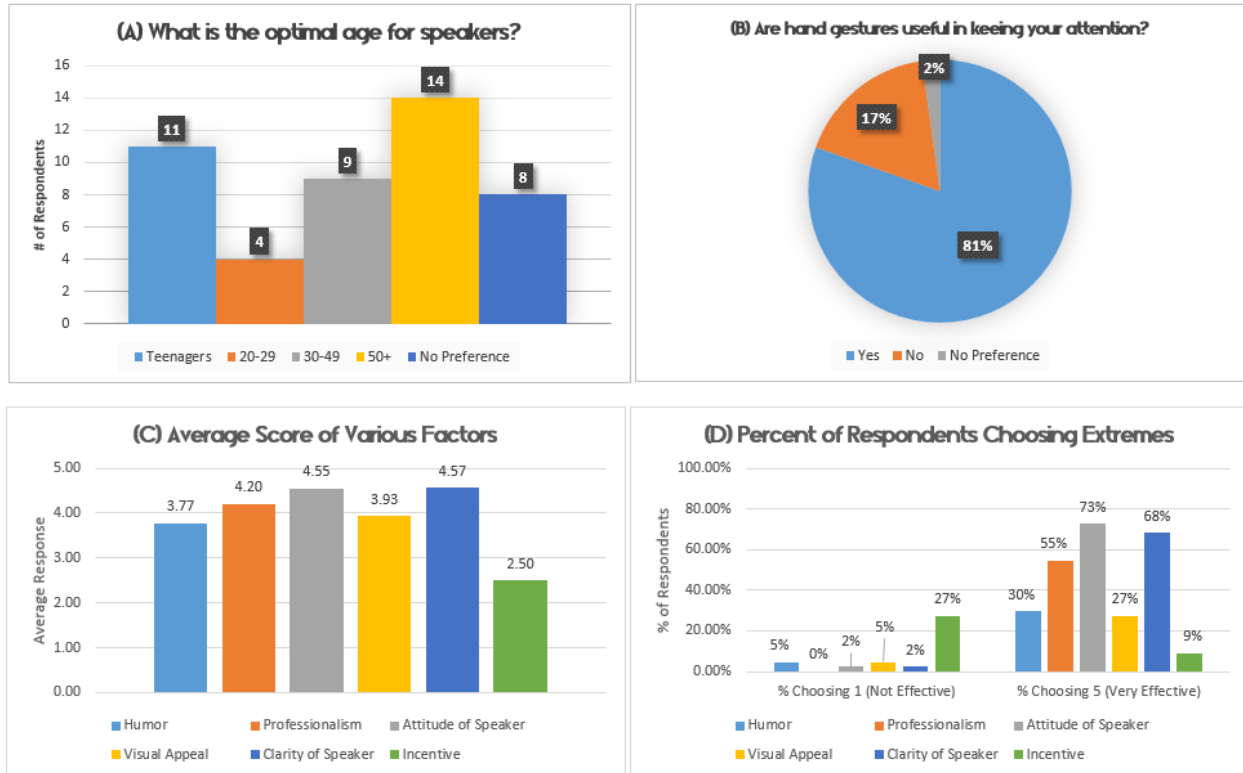


Figure 2: In (A) participants were asked what they felt the optimal age was for speakers. In (B) participants were asked if they felt hand gestures were useful in keeping their attention. This question was meant to ascertain whether older adults preferred an active presence or not. In (C) and (D) participants were asked to rate from 1 (not effective) to 5 (very effective) each of the six different factors in their effectiveness in keeping attention. All graphs contain responses from 46 participants.

speakers (44.00%). Assisted living seniors preferred teenage speakers most frequently (46.67%), while independent living seniors preferred 50+ aged speakers (44.00%, $p = 0.01$).

Next, respondents were asked if hand gestures were important to encouraging engagement (Figure 2B). This question was meant to serve as an indicator for the importance of an active presence during an activity, and the majority (80.43%) of respondents claimed that it was. Additionally, a variety of additional speaker characteristics were rated as important for effectiveness (1 is low, 5 is high) (Figure 2C). To analyze these six factors, the authors performed a single factor ANOVA analysis. We found that the p -value was < 0.001 , demonstrating that at least one factor differed significantly from the others. The F -value (28.57) furthers this assertion. To determine which values were different, a Tukey test was used. There was a significant different between each factor and “Incentive,” which had a mean lower than that of the other factors (2.43). In comparison, “Professionalism,” “Attitude,” and “Clarity” did not differ in their importance (4.20, 4.56, and 4.59, respectively) and were the highest of all factors. These results demonstrate that “Incentive” was significantly lower in preference from the other factors and that “Professionalism,” “Attitude,” and “Clarity” were all rated relatively highly.

The last variable examined was the physical environment for learning (Figure 3). The category of

physical environment included time of day, setting, and atmosphere. Respondents were asked to choose the time of day they felt most focused (Figure 3A). The most desired time of day was in the morning (9 AM – 11 AM), selected by 50.00% of respondents. The least favored times of day were late afternoon and night (5 PM - 7 PM and 7 PM - 11 PM, respectively), which zero respondents chose. In terms of location, two related questions were used to test preferences between a familiar setting and a new setting (Figure 3B-C). A majority, 67.39%, chose a “Familiar Location” to participate in an activity at (Figure 3B). Similarly, a majority, 76.09%, chose the “Same Time” each week to have an activity (Figure 3C). Lastly, we asked respondents to distinguish between activities in a more organized and structured atmosphere versus activities in a more casual and laid back atmosphere (Figure 3D). Most participants (65.22%) chose an “Organized, structured, direct, serious” atmosphere (Figure 3D). A higher percent (43.75%) of males chose a “Less organized, flexible, laid back, dynamic” atmosphere than did females (30.00%). Yet, this result is not significant according to an analysis performed with a chi-square test ($p = 0.35$).

After isolating each of the three factors above, a convergence analysis – in which combinations of three different factors were analyzed to determine the most commonly chosen combination – was performed. Three questions from the survey (shown in Figure 1A, Figure

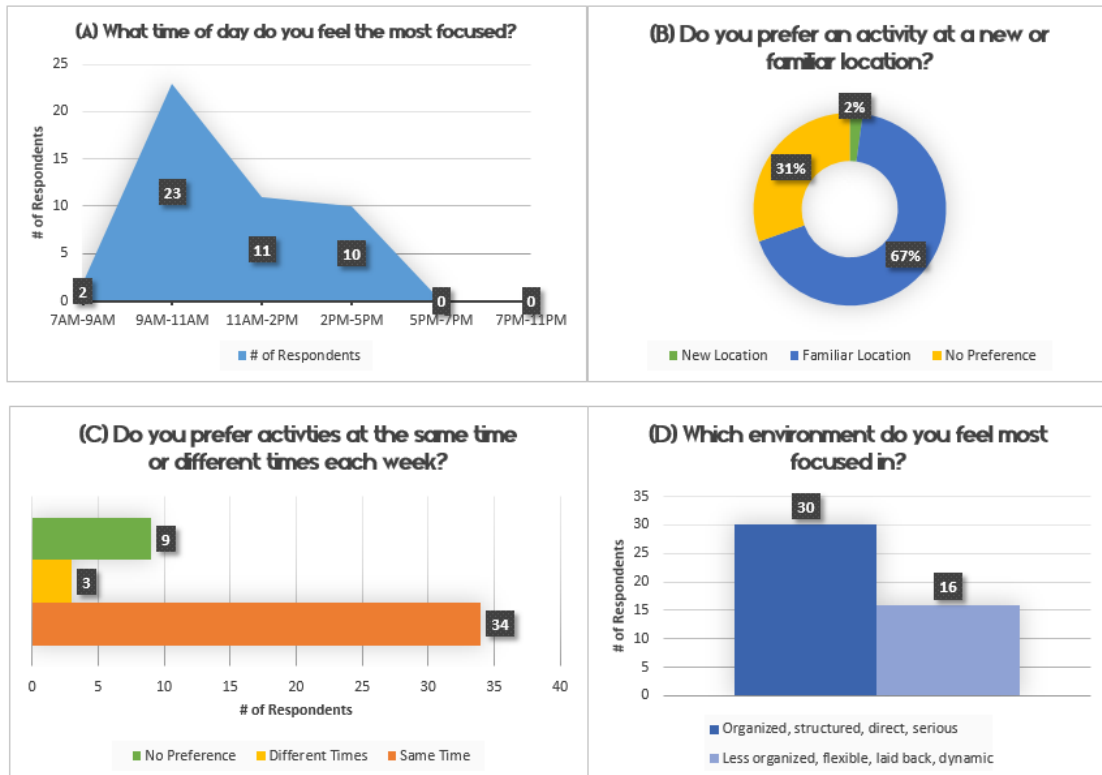


Figure 3: In (A) participants were asked what time of day they felt the most focused and inclined to participate in activities. In (B) participants were asked whether they preferred a new location or familiar location to have an activity at. In (C) participants were asked if they preferred activities at the same time each week or different times. In (D) participants were given the two types of environments to choose between: “Organized...” and “Less organized...” All graphs contain responses from 46 participants.

2A, and Figure 3B) representative of the three variables (delivery methodology, speaker demographics, and physical environment, respectively) were used. Together, the combination of a Guided Hands-On or 1-on-1, a teenage speaker, and a familiar location produced the highest number of respondents (17.39%). The next preferred combination (Guided Hands-On or 1-on-1, a 50+ speaker, and a familiar location) had fewer respondents (10.87%).

Observational Study

We observed the level of engagement in response to various delivery methods in order to obtain objective data about the effects of different teaching delivery methodologies, as well as to supplement the findings from survey about training/learning preferences.

Overall, 14 older adults from a single assisted living center participated in this study. Three different delivery-style stimuli, including 15 minutes of interactive lecturing, 15 minutes of instructive video, and 15 minutes of independent tutorials, were administered to participants in the study. Each stimulus was measured using the same topic and material: technology training (specifically on the use of cell phones). To control for other environmental factors, each teaching delivery stimulus was administered in the same room with the same speaker and content. Importantly, all teachers were blind to the hypothesis of the study.

Out of the 14 people participating in the study, 14.29% were male and 85.71% were female. No participants were engaged in a previous lifelong learning program. The dependent variables (indicators of engagement) examined in this study were: number of people actively watching, number of people not paying attention/looking away, number of people who completed the study (i.e. retention), and number of questions asked by the participants. All of these variables were used as indicators of the engagement level of the participating older adults in response to the stimulus provided. These three factors were specifically chosen as a result of representative factors that the authors, from experience, believed would most accurately reflect engagement. It is important to note that the order of the three styles (interactive then video then written) could have accounted for the following results, as no counterbalance measures were performed on the data.

Our study revealed that the interactive lesson was the most effective of all three stimuli in all three measures (Figure 4). It induced the most questions asked (13) compared to the video (1) (which allowed for questions during and after the video) and tutorial (3) (Figure 4A). The statistical measure for people actively watching and people not paying attention/looking away was calculated as a percentage since there were different numbers of seniors present in the three different stimuli. Again, the interactive lecturing had the highest percentage of people

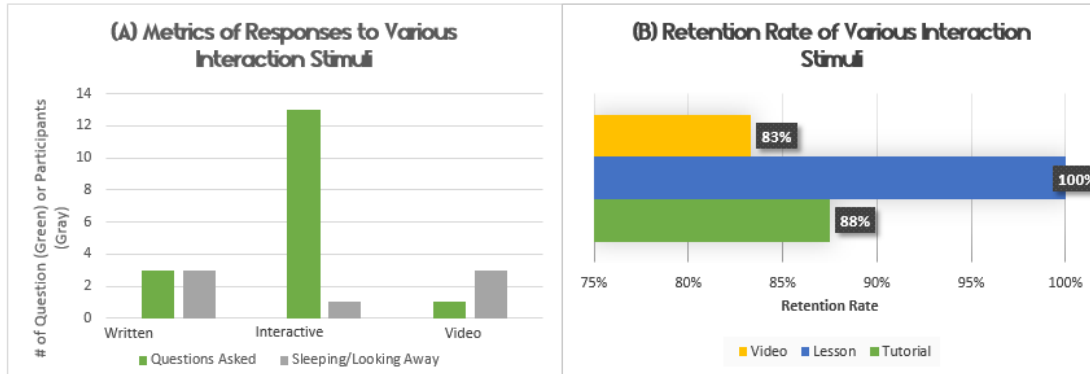


Figure 4: In (A) the number of question asked and the number of subjects sleeping/looking away were recorded for each of the three different methodology stimuli. Questions asked was considered the most important factor in determining how attentive subjects were to the stimuli. In (B) the retention rate of subjects was recorded for each of the three different stimuli. Retention rate was defined as the percentage of subjects who did not leave during the stimulus. All graphs contain responses from 46 participants.

actively watching at 92.86% compared to the video at 75.00% and tutorial at 62.50%. In terms of people leaving before the study ended, the interactive lecturing again had the highest retention rate at 100.00% compared to the video at 77.78% and tutorial at 85.71% (Figure 4B). This was significant according to a chi square test performed on the data ($p < .01$). The participants self-reported that they were able to learn from the lesson, and 100.00% of respondents in a one-question survey indicated that they were able to “successfully learn more about technology” from the lesson.

Discussion

Technology can play an important role in older adults lives, keeping them active and connected to others. Through the use of technology, older adults may be able to reduce stress, increase access to information, and stimulate the mind (18, 19, 20). Technology training programs may be able to facilitate the adoption and use of technology. The goal of this research was to identify older adults’ training preferences and to explore the factors that influence their level of engagement during technology training. The findings of the survey suggest that in general, older adults prefer “Guided Hands-On” and “1-on-1” teaching methods from a 50 + year old instructor who uses hand gestures and speaks with a high degree of clarity. Most participants desired learning in the morning (9 AM - 11 AM), in a familiar setting, at the same time each week, and in a more organized and structured atmosphere versus activities in a more casual and laid-back atmosphere.

Survey

Notably, our findings show a striking effect of living situation on instructor preference. Those in facilities preferred teenagers while the independent seniors preferred those who were 50+. This may result from independent older adults being more comfortable with their peers and possibly wishing to connect more meaningfully through shared experiences in life and in

history. Furthermore, they may be more likely to interact with a greater variety of differently aged people than assisted living seniors and therefore may not have a preference to have younger speakers teach them. This could also be attributed to “Clarity” having the highest mean score on effectiveness. Older adults might feel speakers similar in age are easier to understand than younger speakers, which is mirrored in past studies (2). On the other hand, assisted living seniors may be less likely to interact with teenaged individuals in their typical daily life, so the idea of being taught by a teenaged instructor might be preferred because of this novelty; this population might also feel that teenagers are more experienced in technology. We also found that older adults in assisted living facilities generally preferred activities and events in familiar and easily accessible locations, while a higher percentage of independent older adults preferred more dynamic and new environments. This relationship can be attributed to the fact that independent older adults usually have more access to transportation and therefore may be more attracted to exploring new stimuli.

There was no significant shift of preference based on gender in any of the three variables. However, there was a smaller percentage of male older adults supporting the interactive lecturing method and a larger percentage supporting a less organized and casual environment. These conclusions can be related to a study by Rexroth et al. (2014) on the effect of demographic factors on cognitive ability (17). Roxroth et al. (2014) concluded that males had lower cognitive functioning than did females among older adult ages. Therefore, it is possible that the less organized and less hands-on method chosen by males may be less distracting and better suited for their abilities.

The relatively small sample size of 46 participants in the survey caused an increase in the confidence intervals of the data, and there was no measure of diversity in terms of education, income, ethnicity, and race. Many older adults asked to participate declined (around 40% of those

asked), reflecting some self-selection in the sample. In addition, the relatively limited choices on the survey may have hindered participants from choosing their true answers to the question (for example, participants may have felt an entirely different method not given in Figure 1A would be the most appealing to learn from). In addition, subjective learning was measured by asking how much they thought they learned. Finally, there may be other factors besides the three variables examined in the study that could have influenced the results. For example, physical ailments and the organization level of previous activities (planned in assisted living versus spontaneous in independent living) may have contributed to the preferences of older adults; an older adult may be more inclined to choose interactive lecturing over instructive video and independent tutorials if he or she has a deficiency in hearing or seeing that would prevent him or her from benefiting from that type of learning. Therefore, a larger scale study is needed to understand the generalizability of the results in terms of participant demographics and abilities. Furthermore, it would be important to also include an objective measure of learning, such that teaching effectiveness could be measured.

Observational Study

The results also suggest that seniors, regardless of where they reside, prefer to be engaged and involved in activities that are more hands-on. Interestingly, these findings seem to contradict the preferences of college-aged students in regard to learning style. Of three teaching styles, past research suggests that students at the college level prefer visual-based learning the most and kinesthetic the least of all methods (16). It is possible that older adults have preferences based on learning styles from when they were in a school setting (without the technologically-based visual aids in the modern world), thus feeling more comfortable with hands-on methods. They may also have hearing or vision deficits that would prevent them from being able to partake meaningfully in or pay full attention to an activity. Furthermore, older adults might prefer an activity where they can actually touch and interact with objects and people because it constantly keeps them involved in the activity at hand.

In terms of the limitations, the fact that all participants came from a single assisted living center may have played into the older adults' preferences. It is important to realize that depending on certain demographic characteristics, such as gender and type of living situation, the maximization of the engagement level may differ. However, we did not control for the order of presentation of the teaching delivery methods, confounding this interpretation. This could have led to seniors becoming tired toward the end and thus less engaged. A follow-up study is needed to counterbalance the conditions in order to ensure the results were not related to order of the activities. It is also possible there was "carryover" learning because each learning style readdressed the same topic as the preceding style on

technology (specifically, creating contacts, calling, and texting). However, the amount of learning was not the primary focus of this study. Further, the study had mostly female (85.71%) participants. This could be attributed to the greater interest of females in learning technology to connect with family or simply to help out with the study. This in turn could lead to a greater inclination for interactive learning in which they could meet new people.

General

Despite the limitations, these findings support a more interactive, involved, and organized style to raise the interest level among older adults. These results seem to echo previous findings showing that older adults dislike impersonal, inconvenient technology (thus preferring more familiar, intimate learning) (2). This suggests that in modern society, success in capturing the engagement of older adults stems more from the engaged, formal, and familiar types of activities than from other methods. With an increasing population of older adults, it is beneficial to expose the group to technology. The stereotype that older adults are afraid of technology is unfounded in this study; rather, a lack of experience and proper prevalence of technology training accounts for the relatively low level of usage among older adults. If technology training programs can apply of a more involved, familiar, and interactive style when working with older adults, they may encourage an increased adoption of technology.

With these findings at hand, new research can be conducted to expand the application of older adult engagement level. An important area that can be delved into further could be possible changes in preferences of engagement level through the progression of aging. This would focus on specific ages of participants and track their responses to stimuli over time for any major shifts.

Methods

Survey

Study 1 was an administered paper survey completed by older adults. This study was conducted to assess older adults' attitudes about technology training, including their preferences for the physical environment, delivery methodology, and speaker demographics. The survey included 23 questions that were completed at the participant's own pace. No supplemental materials or visuals were needed to complete the survey.

The survey was 23-questions and consisted of four different question types: multiple choice, short answer, ranking, and rating (see Appendix A). The survey collected demographic information at the beginning and then probed about attitudes related to learning to use technology. In particular, questions assessed preferences for delivery methodology, speaker demographics, and physical environment.

The survey was administered to 18 older adults at 4 assisted living facilities in Alpharetta, Georgia and 28 independently living older adults in New York, Georgia, and Pennsylvania. Older adults were recruited mainly through working with assisted living facilities to

distribute the surveys among their residents. Others were recruited through individuals the author worked with who also helped to give out surveys. Participants (who gave consent for the author to give the survey) completed the survey at their own pace. On average, the survey took around 3-10 minutes to fill out. Surveys were administered in two ways: in-person (89.13%) and online through Google Drive (10.87%). No participants were compensated for taking part in the study.

Frequencies were calculated for each nominal response option. Chi-square tests of homogeneity were conducted to determine if there were significant differences between response frequencies from older adults who lived independently and those who lived in assisted living residences (frequencies less than one were excluded from all analyses). For any questions where there were no significant differences between residence types, the data were combined in the figures. Interval data was analyzed using analysis of variance. The 6 factors that participants rated were analyzed with a one-way ANOVA analysis. Three surveys had 1 question that had to be excluded from the study for one of two reasons: the question was not answered at all or the question was answered incorrectly (e.g., on the ranking questions, only choosing one instead of ranking all four). All statistical analyses were manually developed with the help of Microsoft Excel's SOLVER Tool Pack.

Observational Study

The method and procedure for this study was based on a systematic approach of assessing three different types of engagement strategies. It was divided into three sections (lecture, video, and paper tutorial) to isolate each independent variable. The materials for this study (tutorial, lecture PowerPoint, and video) were developed in collaboration with Technocademy, Inc., a nonprofit organization formed to teach technology to older adults.

The study was conducted within a single assisted living facility in Alpharetta, Georgia that had 14 residents involved. Informed consent was provided via a signed form from the center supervisor. There were three steps of the research process. Step one involved a 15-minute interaction with a paper tutorial in which participants could read through the tutorial at their own pace. Step two involved a 15-minute teaching session that included 1-on-1 assistance with the older adults and encouraged any interaction with their own device. Step three consisted of a 15-minute video segment on a 70-inch projector screen that participants were instructed to listen to intently and ask questions if needed. All three steps involved the same topic material (technology lesson on cell phones) with the same instructors, and each lesson took place in the same room. The reactions and actions taken by the participants were observed and recorded by the experimenter as the activity progressed. Recruitment of participants for the study was done through the help of an assisted living facility in Alpharetta, Georgia, Emeritus Senior Living. A "technology lesson" was scheduled with the facility that helped to attract

the participants. No participants were compensated for taking part in the study.

Acknowledgments

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Appendix A

Survey

If you have not taken part in a Technoacademy lesson, please leave blank all the questions asking about your experience with our service (#4, #5, #8, and #13).

General

1. Gender: Male Female
2. Center: _____
3. Date: _____
4. Topic of the Lesson: _____
5. On a scale from 1 (highly unsatisfied) to 10 (highly satisfied), how satisfied were you with our service?
1 2 3 4 5 6 7 8 9 10

Demographics

6. Approximately, how many family members are you interested in communicating with via technology?
 0 1-2 3-5 6-8 9+

7. Which of the following, if any, do you own (check all that apply)?

- Computer
- iPad/tablet
- iPhone
- Cell phone (non-iPhone)
- Other: _____

8. What is your primary motive for engaging in Technoacademy lessons (pick one)?

- Want to connect with family
- Interested in learning unfamiliar ideas
- Personal use (games, utilities)
- Other people in my center have it and I am interested
- Enjoy spending time with visitors
- Other: _____

Methodology

9. Which method do you find the most appealing to learn from (pick one)?

- Lecture
- Guided Hands-On
- Video Recording
- Reading from Tutorial
- 1-on-1

10. What type of learner would you characterize yourself as (pick one)?

- Seeing
- Touching
- Hearing

11. Which of the following styles of participation do you feel the most interested in doing an activity with (pick one)?

Style 1: An active activity where participants are continually the ones choosing the direction of where to go. (Example: Technoacademy Q&A)

Style 2: A more focused approach where participants have all their activities laid out for them. (Example: Technoacademy lecture)

Style 3: An activity in which participants are given the material to engage with in their own manner. (Example: Technoacademy paper handout guides/tutorials)

12. Which of the following activities most interests you (pick one)?

- Listening to music
- Watching a movie
- Doing a puzzle

Delivery

13. How audible was the volume of our speakers today?

1 (too soft) 2 3 (just right) 4 5 (too loud)

14. Would you characterize volume as an important factor in your ability to pay attention? Yes No

15. Which of these were you most focused on (pick one)? Screen/Projector Speaker Your Device

16. What is the optimal age for speakers in your opinion (pick one)?

Teenagers 20-29 30-49 50+

17. Rank the following aspects from 1 (most important) to 4 (least important) in deciding whether or not you want to participate in an activity.

____ How fun it is ____ Benefits to life ____ Cost ____ Familiarity with activity

18. In your opinion, do hand gestures help keep your attention during activities? Yes No

19. On a scale from 1 (not at all) to 5 (very), rate how important the following methods are in keeping your interest:

Humor	1	2	3	4	5
Professionalism	1	2	3	4	5
Attitude of Speakers	1	2	3	4	5
Visual Appeal	1	2	3	4	5
Clarity of Speaker	1	2	3	4	5
Incentive (food, drinks, rewards)	1	2	3	4	5

4

Environment

20. Which time of the day do you feel the most focused and inclined to participate in activities (pick one)?

- Early Morning (7 AM - 9 AM)
- Morning (9 AM - 11 AM)
- Midday (11 AM - 2 PM)
- Afternoon (2 PM - 5 PM)
- Late Afternoon (5 PM - 7 PM)
- Night (7 PM - 11 PM)

21. Would you rather have an activity at a new location or a familiar location?

New Location Familiar Location No Preference

22. Would you rather have activities the same time each week or at different times each week?

Same Time Different Times No Preference

23. When participating in activities, which type of setting do you prefer?

- Organized, structured, direct, serious
- Less organized, flexible, laid back, dynamic