

MULTI-GENERATIONAL LEARNING IN THE CONTEXT OF TOY DESIGN

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ABSTRACT

Education is a vital process for everyone, it helps people to think, feel, and behave, which contributes to their success. Education is important not just for children but also for the elderly. The increasing proportion of elderlies globally raises the importance of lifelong learning, specifically elder education. Furthermore, the significance of the grandparent-grandchildren relationship increased due to two factors: The number of grand families - the nuclear family living with the grandparents - increased globally by 7.3% (Beltran, 2019), and the average lifespan of people increased. Therefore, multi-generational learning, the learning derived from old and young generation interaction, takes an important role in families and society as a whole. Past studies show that multi-generational education benefits both age groups in various ways. For children, grandparents offer life wisdom, acceptance, love, and positive effects on a child's well-being, whereas for the elderly, having strong connections with the younger generation allows them to be exposed to new ideas and information, especially technology-related knowledge. Based on the research conducted, results show that over 70% of parents and grandparents find a lack in grandparent-grandchildren interaction, reducing the chances of multi-generational learning, whereas the majority of them find indoor toys a good tool to boost grandparents-grandchildren interaction. According to the criteria stated, a toy was specially designed for elders and children to enhance the training skills, boost the entertainment aspect of existing toys, and at the same time increase multi-generational learning and interaction. Based on the feedback from users, possible improvements were identified and modified for future development.

Keywords: Education, grand families, multi-generational learning, toy design

1 INTRODUCTION

Play is the highest form of research' - Albert Einstein. Learning is not and should never be purely sitting in the classroom with a transmissive teaching style. Learning can be derived through having fun, through conversations and interactions, and game/toy play. During play, learning is less regimented, this often leads to unexpected outcomes, allowing lateral thinking to happen. This applies to people at all ages, from children to the elderly. Hence, the idea of learning with multi-generational education through game play is established and developed in this paper, hoping to contribute to the education field uniquely.

2 BACKGROUNDS

2.1 Importance of education for children and elders

Education, the obtaining of knowledge and understanding a variety of subjects to be applied in daily life, takes an important role in a human's life. It is vital because it provides stability in life, allowing individuals to achieve better possibilities in career and personal growth (Eugene, 2015).

Children's education is very important because it provides them with the tools and mental characteristics required to excel in life (Anglia, 2020), which has the power to change lives, whether being the tool for breaking the cycle of poverty, supporting child survival, development and well-being; and minimizing the social inequality gap (UNICEF, 2014). Although children's education is important, elder education also plays a decisive position in society, but is often being forgotten by the public. As the saying goes: 'It is never too old to learn', elder education should be encouraged and attach importance to the society because it can benefit elderlies in various ways. For example, the opportunities for elders to pursue studies and participate in different social interactions can foster their physical and mental well-being (Elder academy, 2020).

2.2 Multi-generational education

Since children's education and elder education are both important to the individuals as well as to the society, 'multi-generational education' becomes an area worth exploring. Multi-generational education is a learning which stems from younger and older people interacting, whereas the older generation can offer the younger generation life wisdom, acceptance, love, stability to children, and having positive effects on child's well-being. For example, elders can teach the children how to react and continue with life setbacks. On the other hand, the older generation having connections with the younger generation can be exposed to different ideas, boost brain function, protect against depression, and even increase lifespan (The Waterford, 2017). For example, children can teach the elders how to use the technical devices. Most importantly, with the increasing interaction between elders and youngsters, multi-generational education can strengthen grandparent-grandchildren bonding, or family bonding, creating strong emotional ties with each other. Therefore, multi-generational education provides valuable insight which contributes to each family as well as the whole society.

In addition, according to the WHO, the proportion of the world's population over 60 years old will nearly double from 12% to 22% between 2015 and 2050 (WHO, 2021). With the increasing ageing population globally, it is essential that the different generations can have positive interactions and each group should acquire knowledge from one another. Furthermore, the aging population has brought attention to the generation gap created, which is the difference in values and attitudes between two generations because of the misunderstanding of each other from their different experiences, opinions, habits, and behaviours (Mendez, 2008). In order to reduce the generation gap, increasing generation interaction and multi-generational learning is considered a suitable way.

However, this is easier said than done. Multi-generational learning is difficult to achieve through the traditional education style, or in other words, providing them with the learning materials and asking them to read, write and speak. Another type of learning should be conducted, and this is through educational toys. 'Playing is the best way kids start to learn; playing is the best way elders come back to learn'. The benefits of playing games and toys for children is that it encourages them to enhance their senses, spark their imagination and boost their social skills, which help their intellectual and motor development (Skippy, 2020). Toys are often dismissed as 'just for fun' but playing is essential for children since it enables them to 'learn about and interact with their world, and gain the mental, physical and social skills necessary to succeed in their adult lives' (Lily, 2021).

Through multi-generational toy playing, children can engage in conversation with seniors, which can practice their listening skills, especially when elderlies often do not speak clearly. Children can also promote creative thinking using their imagination in play, and also help them express their thoughts and feelings more openly to their family members. The benefits of playing games and toys for elders is that it encourages them to communicate and interact with the children, letting them learn the ways to interact with the children to make them both comfortable and engaged. Mentally, it can train their working memory, the ability to temporarily store information in mind while working on other tasks, which is very critical to their lives as it helps elders recall important information that they may need at a particular moment. Physically, it can strengthen muscle control, while also increasing blood circulation. Therefore, linking the above to multi-generational education, if an interactive toy is being designed specifically for elders and children to play together, it will enhance multi-generational learning through various ways. The grandchildren, grandparents, parents, the whole family bonding will be strengthened through a simple toy design. Although the toy may not be the only factor bringing family members together, it surely will begin the generational interaction and bring a positive atmosphere within families.

3 DATA COLLECTION / METHODOLOGY

3.1 Collection method

Based on preliminary research, multi-generational education can be achieved through toy design. To further understand the necessary form and function of toys to be most effective for cross-generational education, primary research in the form of surveys and interviews were conducted via google forms and video calls (which could not be recorded due to privacy issues).

3.2 Online survey

To be specific, the surveys are mainly focused on participants aged between 15 to 55, given that they will be the targeted product initiators, i.e., they are the main groups who will buy the toy. Questions

from different categories, such as types of toys and or games, ideal materials, playing environment etc., were made into multiple choice questions for easier and specified responses.

3.3 Online interview

6 interviews were conducted, ages ranging from 33 to 87, with 3 parents and 3 grandparents. The interview focused on the parents and grandparent's opinion. Grandparents were included in the interview part since they have the ability to speak out their ideas clearly. The interview questions are freer compared to the survey since allowing the users to express their ideas and opinion freely can stimulate innovative ideas which were not thought of during the survey.

4 DATA ANALYSIS

4.1 Survey results

Over a period of 1½ months, there were a total of 131 survey participants, Figure 1. A majority of participants (~80%) preferred board games and puzzle games as they consider these to be the easiest game to understand and play. 77% of the respondents preferred indoor toys, one of the main reasons being the impact of COVID-19, most people work from home and stay home for most of the time. Regarding the toy colour combination preference, 41.3% of the respondents chose Red & Blue because the two colours are commonly considered as competitive colours, increasing tension between players. Finally, when asking participants how the grandparent-grandchildren can be improved, 38.9% believe more interactions will benefit the most, with 32.2% of the participants considering playing toys and games together can improve the relationship.

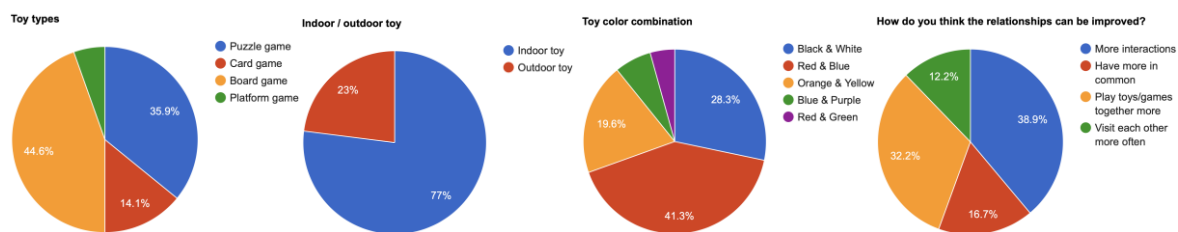


Figure 1. Pie chart survey results

4.2 Interview results

Statistics about multi-generational learning were collected from 6 interviews and 131 surveys. The results show that over 70% of parents and grandparents find a lack in grandparent-grandchildren interaction, reducing the chances of multi-generational learning, in which the majority of them find indoor toys a good tool to boost grandparents and grandchildren interaction. In addition, a large number of parents agreed that toys should comprise the 'education' aspects, which for the elderly is the working memory, and for children is the eye-hand coordination.

5 MARKET RESEARCH

To further develop the design criteria in which the concept toy will follow, brief market research was conducted to find what current products are lacking, or areas with rooms for improvement that can be included, Figure 2. Toys designed specifically for children and the elderly with specific skill training features were being studied with comments reviewed. The purpose of this is to learn the similarities and differences between children's toys and elderly toys and combine the features into an integrated toy design. For children's toy research, many of the current toys which involve 'eye-hand coordination' skills were being studied. Results show that most toys use both hands and are mostly 2 players since the unpredictable movement of opponents enhances the children's eye-hand coordination. For elder's toy research, toys incorporating 'working memory' were being studied. Many of the current elder toys involve the use of balls, with different sizes, softness, and purpose. The common factors of children and elders' toys are muscle strength and muscle control. Most toys train the player's ability to hold, grip, move, or balance, enhancing their muscle control, which benefits the body as it activates blood circulation and also increases muscle strength and endurance. However, when reviewing the comments and feedback from customers of current toys, it was found that some of the skill training toys often lack entertainment due to repetitive movements. Many children's toys made for tackling coordination

problems are often considered too childish for older children. Many of the elder's toys are considered more of a tool rather than a toy. Therefore, improvements were being made in later toy design.

| Pop & catch basket | Magnetic Football | TrueBalance | Buddy Builder | Memory Lock Box | Playable Art Ball | Magic Cube Maze | Stringy Ball |
|---|--|---|--|--|--|---|---|
|  |  |  |  |  |  |  |  |
| ★★★★★ My 5 year old has a blast with these. Hard plastic and not cheap I love it and not afraid of it breaking. | ★★★★★ Simply GREAT!!! Ridiculously FUN!! Very similar to "AIR HOCKEY" but no need for the air or any plug whatsoever (also not as damn big!). | ★★★★★ Our whole family likes to try their hand at this. My nine year old has some coordination problems and this is helping him. | ★★★★★ This will be great for sorting, the concept of adding one more, and balance! My 7 year old son loved it! However, my 11 year old son did not enjoy it haha. | ★★★★★ My dad with dementia was always tinkering with things and taking things apart (like his television) in his apartment. This was a great tool to channel the need to tinker and "fix" something into a safe activity. | ★★★★★ A dear relative has dementia and fidgets constantly, she picked it up and began fiddling with it, keeping her hands busy. | ★★★★★ Well made and enjoyable. Later stage dementia client enjoyed it as I think it could be seen as too easy otherwise. | ★★★★★ My 88 year old mother who has arthritic hands and dementia is always practicing other hand exercise balls. This one keeps gently around her wrist and she can drop it to target... and pick it up when she would like to use it again. |
| ★★★★★ Very cheaply made. I was playing with my grandson and the one I was using just fell apart. I was so upset. | ★★★★★ Online it looked like everyone was having a blast playing it but after a half hour of playing, it was monotonous and boring. | ★★★★★ My son literally played with it 2 minutes and set it down and asked me to return it. Not a toy that will be played with again and again. | ★★★★★ I was so excited to get these. I ended up returning them. It was a pain to get them to stay together most the time. | ★★★★★ WHY would you have a product to teach Dementia how to undo locks? Makes no sense, since many go missing and get lost because of knowing how to open locks. | ★★★★★ I dislike this because I thought the balls were magnetic and they aren't, they are all connected by plastic screws and defeats the purpose. | ★★★★★ Very fun at the beginning but becomes repetitive afterwards. However, still a good toy for kids and elders. | ★★★★★ Sadly too small and hard to be used by my disabled grandfather. He cannot grip them at the stage he is at now. |

Figure 2. Children and elder toy marketing research

6 DESIGN CRITERIA

Design criteria are created for the toy design. The toy aims to enhance multi-generational learning with improved skills of eye-hand coordination, working memory, and muscle control. In addition, grandparent-grandchildren relationships can also be boosted. The game type of the toy is a combination of puzzle game and board game, which is the most voted game mode and the most suitable for both children and elders. The material of the toy should be plastic as it is the most cost-effective, safe, and easily cleaned material. The colour combination is red and blue according to the survey results. Furthermore, since many of the grandchildren and grandparents do not live together regularly, it is vital to make the toy small and portable.

7 FINAL TOY DESIGN

7.1 Toy design introduction

A toy named 'G2G' is designed, which means Grandparent to Grandchildren with 2 players, was designed according to the design criteria, as shown in figure 3.

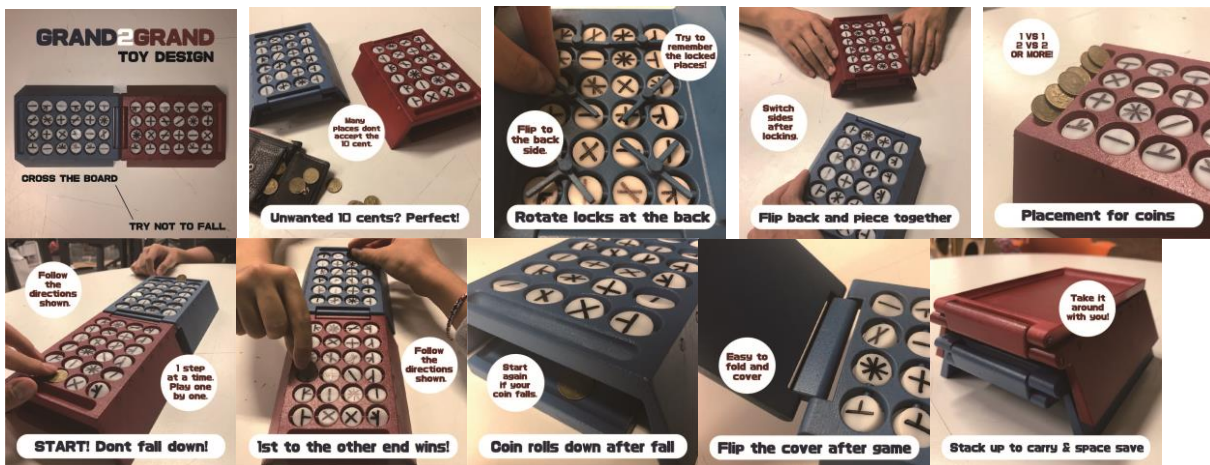


Figure 3. Images of toy & how to play

The toy consists of two separate boards, with 24 rotatable circles on it. The total 48 rotatable circles contain different directions on both sides, indicating the directions the players can move each time. On the back of the board is the locking mechanism. Before the gameplay, players can rotate the locks to their desired places. The 'piece' to play with is a 10 cent Hong Kong dollar. The reason is that the 10 cent Hong Kong dollar is only worth ~0.01 US dollars, and many of the places do not accept the 10 cent coins, leaving a waste of unusable coins. Some people even discard these coins. Therefore, this game uses the 10 cents as the piece to cross the boards, hoping to reduce non-essential waste and bring positive influence on society. The main goal of this game is to cross the board with the piece without falling into the traps. The players go over at a time, following the directions indicated. The first to cross to the other end wins. If the piece falls from the trap, it will roll down back and the player needs to start all over again.

7.2 Benefits of toy

Through 'G2G', multi-generational learning can be achieved. During gameplay, grandparents and grandchildren will communicate frequently, which might lead to deep and meaningful conversations. The grandchildren might be impatient and frustrated when the piece keeps on falling. This is when the grandparents can appease them and teach them how patience is important in life. Or at times the grandchildren might be a sore loser, which the grandparents can teach them that 'you win some, you lose some, you cannot win them all, and that 'there does not exist an eternal loser, nor an eternal winner', just like life. On the other hand, the grandchildren might also lead the conversation to similar online games as the G2G, telling grandparents the types of games children at their age are playing nowadays, leading to technological conversations, the field where grandparents are not familiar with and should learn about. Hence, multi-generational learning through game conversations and interactions benefits both groups.

Since the toy is small and portable, the grandchildren can bring it to their grandparent's house easily if they live separately. In addition, the game requires players to pick up the pieces and move them around the board, and also rotate the locks at the back. It trains their ability to perform movements with hands while being guided by their eyes, enhancing eye-hand coordination, while also improving their muscle strength and muscle control. The players also need to remember the traps the opponent and themselves made, and prevent stepping on them, sharpening their working memory. Therefore, G2G also boosts their physical and mental skills, which is vital for both groups. Overall, G2G allows multi-generational education to be achieved through toy playing, providing impact and insight to the new education system. Most importantly, it increases interaction between grandparents and grandchildren, which strengthens the grandparent-grandchildren relationship, benefiting grand families and society as a whole.

7.3 Further development and improvements

The game uses 10 cents Hong Kong dollars to play, which is limited to the Hong Kong region only. If considering the global market, a piece of a similar size and weight will be included in the toy set. In addition, the 10 cent coins might be contaminated and dirty, especially during the COVID-19 pandemic. Therefore, providing a coin-like piece for the toy set might be a more suitable way. Furthermore, storage for the pieces should also be attached to the board to prevent piece loss.

8 CONCLUSIONS

In conclusion, multi-generational education has become increasingly important these days, which can be achieved through game playing. The designed toy - G2G is anticipated to enhance multi-generational learning through grand to grand interactions, building a mutually beneficial relationship. This type of learning is very much different from traditional in-class learning, in which the students are forced to acquire knowledge. The learning model for this is more towards learning autonomy, whereas children and the elderly gain knowledge through listening, sharing, and observing. G2G is concept-based, modifications will be needed for further development. Although the research was on a small scale with limited time, hopefully, the final results are meaningful in certain perspectives, and that some parts of the findings and design may contribute to the education field and the society.

REFERENCES

- [1] Anglia N. (n.d.). *Why is education important?* Why is Education Important? | Nord Anglia. Retrieved December 21, 2021, from <https://www.nordangliaeducation.com/news/2020/03/06/why-is-education-important>.
- [2] *Child development & education*. UNICEF Canada : For Every Child. (n.d.). Retrieved December 21, 2021, from <https://www.unicef.ca/en/discover/education>.
- [3] *Children's family structure-2021 - bgsu.edu*. (n.d.). Retrieved December 21, 2021, from <https://www.bgsu.edu/content/dam/BGSU/college-of-arts-and-sciences/NCFMR/documents/FP/westrick-payne-wiborg-childrens-family-structure-2021-fp-21-26.pdf>.
- [4] *Education is the key to success by Jasmeeane - April 2015 scholarship essay*. Private Tutoring. (n.d.). Retrieved December 21, 2021, from https://www.varsitytutors.com/scholarship_entries/jasmeeane-5617.

- [5] *Generation Gap* | SpringerLink - link.springer.com. (n.d.). Retrieved December 21, 2021, from https://link.springer.com/referenceworkentry/10.1007/978-0-387-33754-8_195?view=modern&page=5.
- [6] *How dementia patients can benefit from physical therapy exercises*. Foothills Sports Medicine Physical Therapy. (2021, March 11). Retrieved December 21, 2021, from <https://foothillsrehab.com/blog/dementia-physical-therapy/>.
- [7] Laron C., Seiden A. and Knudsen A. (1984). *Electronics basics*. Amazon. Retrieved December 21, 2021, from <https://www.amazon.com/electronics-store/b?node=172282>.
- [8] Mayo Foundation for Medical Education and Research. (2021, March 10). *Memory loss: 7 tips to improve your memory*. Mayo Clinic. Retrieved December 21, 2021, from <https://www.mayoclinic.org/healthy-lifestyle/healthy-aging/in-depth/memory-loss/art-20046518>.
- [9] *Occupational therapy townsville: Allied Health: Apricus Health*. Occupational Therapy Townsville | Allied Health | Apricus Health. (n.d.). Retrieved December 21, 2021, from <https://www.accesstherapyservices.com.au/the-role-of-hand-eye-coordination-toys-in-occupational-therapy/>.
- [10] Tuxworth, N. (2015). *Toys*. Amazon. Retrieved December 21, 2021, from <https://www.amazon.com/toys/b?node=165793011>.
- [11] The Waterford. (2017, October 4). *What is multi-generational learning?* The Waterford. Retrieved December 21, 2021, from <https://thewaterford.net/2017/10/04/multi-generational-learning/>.
- [12] *Why are educational activity toys important for your kids?* Skipy Blog. (2020, January 28). Retrieved December 21, 2021, from <https://www.playskipy.com/blog/educational-activity-toys/>.
- [13] *Why is education important: All the reasons to stay in school*. University of the People. (2021, December 9). Retrieved December 21, 2021, from <https://www.uopeople.edu/blog/10-reasons-why-is-education-important/>.