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Flat Earth: An Approach to Enhance Public Responsibility to Motor Impaired People

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Abstract: *The concept of enhancing public responsibility to people with disabilities is to increase general awareness to understand the needs of motor-impaired people (MIP). The facts of the daily experience and possible difficulties of MIP were transformed into a tabletop game. In order to be prepared for the aging population happening in China, Flat Earth was designed as one solution that can be delivered to the public to improve individuals' cognition of disabilities by playing as a character with limited motor ability in Flat Earth.*

Keywords: *Disability, Wheelchair Users, Public Responsibility, Tabletop Game, Motor Impaired, Accessibility, Inclusive, Universal Design*

1. Introduction

Disability is a critical issue and must be addressed in order to solve the problems to make the reachable environment to be more accessible. Though time is needed during this process, the slowly changing environment takes time for a qualitative change in MIPs' experience. While the architectural barriers still exist, and the indoor navigation in shopping mall was influenced due to the labyrinth-like design [1]. These architectural difficulties are physical obstacles to the MIP, and might not be aware by people without any disabilities [2]. However, these semi-permanent obstacles unlike the temporary ones would not be discussed in how should be redesigned in this paper. Also, there are smart wheelchairs under developing [3, 4], the cost for these wheelchairs is under concerning for MIP with lower-income [5]. Though there are variant studies on accessible or inclusive design, the key lacking is the number of participants with disabilities [6]. On the one side, in order to further improve these studies is uncomplicated by increasing the number of participants. On the other side, applying a point of view as a MIP could change the way of thinking. Thus, the awakening of public responsibility was brought to the table. With higher public awareness and turning it into behavior, not only the scholars but also the public would have a deeper understanding of the needs of MIP compared to the past.

The main subject to be addressed in this paper is mapping. Accessible route navigation was researched by scholars such as Linda Beale et al. [7] in Mapping for Wheelchair Users: Route Navigation in Urban Spaces in 2006. The use of the Geographic Information System (GIS) provides a solution as a standard for accessible wayfinding criteria. The visualization of geographic information on the map is the inspiration for Flat Earth. To further simplify and restructure the obstacles in real life, there must be s definite style which could be easily understood by users from different age groups to provide the point of view of MIP. The final decision of Flat Earth is the pixel style which has strong connection with the video games [8]. For educational purpose, the Flat Earth designed to be a tabletop boardgame since boardgame is a useful teaching tool [9].

The following sections in this paper will be divided into three parts. From section 2.1, the method of investigation on public attitude of MIP was discussed, and each question asked will be explained. From section 2.2, the design concept and each rule of the Flat Earth will be shown and explained. The section 3 will be the result of investigation and the final look of Flat Earth. The section 4 is the conclusion for this research.

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2. Disability and Social Awareness

2.1. Questions Need to Know from Participants

The public plays one of the most important parts in this study, and to further understand the subjective people, it is necessary to send questionnaire to get the point of view. The questionnaire includes seven questions need to be answered, and the main purpose for this questionnaire is to collect opinions from the general society, and mainly, from who does not have any long-term disability.

The questions are:

(1) How do you feel about accessible facilities?

(2) Have you ever experienced difficulty with moving?

(3) How do you feel when you see someone using wheelchair in the public?

(4) Have you ever imagined your life after 60?

(5) Do you think current accessible facilities are enough?

(6) Have you ever been aware that scenes like stairs, steep hills, or puddles create inconvenience for people with disabilities?

(7) Where do you find our society could do more for people with disabilities?

Question (1) provided 5 answers as choices, from positive to negative, and there is no standard answer due to this questionnaire was only used to collection subjective opinions, and this concept continued in the following questions. While physical might aging might create disability, it is necessary to ask if the participants ever experienced temporary disability during their current and past life stages. It is important to investigate and the percentage of the answer from question (2) could show the significance of this research.

There is no surprise that the participants observed MIP during their day-to-day life, but the question (3) is asking the feelings on their observation as a part of this study of public awareness. With more positive answers on this question, the following solution will be easier to design compared to a society with unfriendly attitude towards MIP.

From question (4) to question (5), the fundamental concept is to let the participants put themselves as a part of the disabled group. Though imagination might not be the final result, it is still important to know how the participants see this this problem. In the question (4), the way of asking is more direct and personal than question (5).

In the question (6) and question (7), there are more free play spaces compared to the above questions. The participants would be able to answer as many as they want, because these are not “yes or no” questions. From the answer, a solid understanding of the public could be built for further studies as reference.

2.2. The Design of an Inclusive Board Game

In order to provide the full point of view of MIP into the game, the designing start from the characters. From the study by Limin Zeng et al. [10], the elderly people should be a separate group from the MIP. Use this rule as an inspiration, the characters were designed in three kinds: Savage represents people without mobility problems and is willing to help others; the rider represents MIP, and the bard refers to the elders.

The concept of the Flat Earth is to teach the audiences and improve the public awareness by providing the point of view of MIP, but the element of mapping in the design makes the Flat Earth to become a racing game. To reduce the competitive part, the opposite to competitive must be enhanced, and it is the cooperation. Players need to cooperate with teammate to achieve an ideal result. The expecting influence of this game is that showing the benefits by providing help to MIP will eventually benefit ourselves.

The initial design style of the Flat Earth is the pixel style. The pixel art has a history background with video games [8], but the softness of the concept of inclusive design was combined with the pixel style. By softening the edges, the respect for the genre of pixel art remained, but the contemporary graphic design spirit brings the style into a modern form.

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3. Results

3.1. The Conclusion of the Questionnaire

There are in total of 238 participants answered this anonymous questionnaire. There are 23% of the people who answered this questionnaire had experienced moving disability due to accident or diseases. And this proved that including people with disabilities, there are more than a quarter of people will benefit from a better navigation solution in the future. Thus, providing help to people with disabilities is benefit the overall society.

3.2. Analysis of Questionnaire

The result of question (1) mentioned in section 2.1 refers to Table 1.

Table 1: How do you feel about accessible facilities?

Choices	Answers	Percentage
Very good and looking for more	197	86%
Good	28	12.2%
None of my business	4	1.7%
Waste	0	N/A
Unnecessary	0	N/A

The result isn't far from the prediction. 98.2% of the participants gave positive answers means these people might be the targeted audiences of the Flat Earth. Though there is no one chooses negative answers, the honesty of the participants should be reconsidered.

The result of question (2) mentioned in section 2.1 refers to Table 2.

Table 2: Have you ever experienced difficulty with moving?

Choices	Answers	Percentage
Yes	53	23.1%
No	176	76.9%

Considering the age group of the participants which was not mentioned in this questionnaire is from 18-65, 23.1% is a high percentage for this age group. This result could transfer into how many people have the point of view of MIP.

The result of question (3) mentioned in section 2.1 refers to Table 3.

Table 3: How do you feel when you see someone using wheelchair in the public?

Choices	Answers	Percentage
He/She better stay at home	10	4.4%
Nothing special	154	67.2%
Block the way	2	0.9%
Others	63	27.5%

From this question, there are 0.9% of the participants thought the MIP (especially the wheelchair users) became obstacles to themselves. Comparing this result to the answer to question (1), it is necessary to doubt the honesty of the participants. 27.5% of the participants choose "Others", and had their answers written. Those written answers could be concluded as positive answers.

The result of question (4) mentioned in section 2.1 refers to Table 4.

Table 4: Have you ever imagined your life after 60?

Choices	Answers	Percentage
Yes	98	42.8%
No	131	57.2%

Referring to the result, there are 57.2% of participants never thought about their life after 60, which is less than the result from question (2). There are 19.7% of the participants never had mobility issues or imagined life after 60.

The result of question (5) mentioned in section 2.1 refers to Table 5.

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Table 5: Do you think current accessible facilities are enough?

Choices	Answers	Percentage
Yes	7	3.1%
No	222	96.9%

Only 3.1% of participants believed there are enough accessible facilities, and the rest of them believed there are not. This is shown that most of the participants realized there are more things that need to be improved, but their concern is how to enhance the features provided in public spaces.

The result of question (6) mentioned in section 2.1 refers to Table 6.

Table 6: Have you ever been aware that scenes like stairs, steep hills, or puddles create inconvenience for people with disabilities?

Choices	Answers	Percentage
Yes	180	78.6%
No	23	10%
Yes, and there are more	26	11.4%

Though 78.6% looks like a large number from the result, the scenes mentioned in the question are just examples. From research done by Limin Zeng et al [10], volunteers involved in the case study usually would not notice existing obstacles other than the required stations. Thus, a lack of point of view of MIP will influence the quality of the help provided by the public.

Since question (7) from section 2.1 is a free to answer question, there is no analysis chart refers to this question. An overall conclusion will be followed in section 4.

3.3. The Flat Earth

After defined the tone and design style for the Flat Earth, the rules were created for a collaborative boardgame, shown in Figure 1. The rules are:

(1) Players are divided into 2 teams;

(2) Score by getting through the goal;

(3) If all of the team members pass the goal in the same round, then get a double score;

(4) Dice from 1-4, one side to draw an event card, one side to roll again;

(5) Player can choose their role to play, but each team can only have one rider and one savage (or only one rider or one savage) for equity;

(6) Each spot on the map has a default setting;

(7) Each team has to arrive at the goal twice to complete the game.

Referring to rule (4), there are 18 event cards in the Flat Earth. Each card has a different effect, and the player could expect accidents throughout the gameplay. There are cards that will bring bad fortune to the player which may result in their lose. There is an unpredictable element in the gameplay of the Flat Earth. It will make every game a unique experience. This is created to make the Flat Earth more enjoyable with an unchangeable map. The event card will have the ability to change the game.

Figure 1: "Flat Earth"

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4. Conclusions and Future Improvement

This is an approach to enhancing public responsibility by increasing awareness of MIP during daily life. Using the board game as a medium to fulfill the educational purpose for people from young to old is a possible solution. Through the questionnaire, the attitude of the public could be concluded to be a positive sign for future study. There are several things that will be improved in the future, such as the questions from the questionnaire are supposed to be neutral, compare to now these questions were suggestive and might influence the answers received for research.

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References

[1] Romedi, Passini. (1996) Wayfinding Design: Logic, Application and Some Thoughts on Universality. Design Studies, Volume 17, Issue 3, Pages 319-331, ISSN 0142-694X, https://doi.org/10.1016/0142-694X (96)00001-4.

[2] Zeng, L., Kühn, R. and Weber, G. (2017) Improvement in Environmental Accessibility via Volunteered Geographic Information: A Case Study. Univ Access Inf Soc 16, 939–949. https://doi.org/10.1007/s10209-016-0505-9

[3] Sandoval-Bringas, J.A., Carreño-León, M.A., Sandoval-Carreño, M.A. (2022) Electronic Device Adaptable to Motorized Wheelchair as Smart Navigation System. Univ Access Inf Soc. https://doi.org/10.1007/s10209-022-00889-5

[4] Simpson, R.C., Levine, S.P., Bell, D.A., Jaros, L.A., Koren, Y., Borenstein, J. (1998). NavChair: An Assistive Wheelchair Navigation System with Automatic Adaptation. In: Mittal, V.O., Yanco, H.A., Aronis, J., Simpson, R. (eds)

[5] Assistive Technology and Artificial Intelligence. Lecture Notes in Computer Science, vol 1458. Springer, Berlin, Heidelberg. https://doi.org/10.1007/BFb0055982

[6] Barlott, T., Adams, K. and Cook, A. (2016) Increasing Participation in the Information Society by People with Disabilities and Their Families in Lower-Income Countries Using Mainstream Technologies. Univ Access Inf Soc 15, 189–198. https://doi.org/10.1007/s10209-015-0418-z

[7] Prandi, C., Barricelli, B.R., Mirri, S. (2021) Accessible Wayfinding and Navigation: A Systematic Mapping Study. Univ Access Inf Soc. https://doi.org/10.1007/s10209-021-00843-x

[8] Linda, Beale, Kennethm, Field, Davidm, Briggs, Phil, Picton and Hugh, Matthews. (2006) Mapping for Wheelchair Users: Route Navigation in Urban Spaces, The Cartographic Journal, 43:1, 68-81, DOI: 10.1179/00087 0406X93517

[9] Fernandes D L, Ribeiro M F, Cerqueira F R, et al. Describing image focused in cognitive and visual details for visually impaired people: An approach to generating inclusive paragraphs [J]. arXiv e-prints, 2022.

[10] Zeng, L., Kühn, R. and Weber, G. (2017) Improvement in Environmental Accessibility via Volunteered Geographic Information: A Case Study. Univ Access Inf Soc 16, 939–949. https://doi.org/10.1007/s10209-016-0505-9