How 'Empathetic modelling' positively influences Architects' empathy, informing their Inclusive Design-Thinking

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ABSTRACT

Empathy is described in the literature as being the first stage in the Design-Thinking cycle. Architects and Design professionals should 'Empathise' with their users to understand their needs and gain insight into the exclusion barriers that many users face within the Built Environment. This paper presents the results of a study conducted with a cohort of Architects, investigating whether an 'Empathetic Modelling' intervention could influence their intrapersonal state empathy levels and inform their inclusive Design-Thinking. A validated empathy scale was used to measure Architects empathy levels, pre and post intervention. Visual acuity and hand dexterity were the two capability losses simulated, with participants performing common Activities of Daily Living (ADL) and two design tasks. Results showed that all participants empathy scores increased, when comparing pre and post-test measures. This was supported with qualitative data, with results suggesting that all participants gained unique and useful insights into how they can incorporate more accessibility, adaptability and inclusivity into future designs, to reduce user exclusion within the built environment. This increased awareness of incorporating an inclusive design philosophy, has positive implications for design professionals understanding the diverse needs of the wider user population and especially for the increasing ageing population, who want to maintain their independence and enjoy barrier-free access to the built environment.

KEYWORDS

Empathetic modelling, Architectural Empathy, Inclusive Design-thinking

Introduction

The built environment can facilitate or impede an individual's ability to participate in society, placing the Architectural profession at the forefront of delivering inclusive and accessible designs that enhance and advocate social equality (Mulligan et al., 2018). Knowing the users' needs and aspirations and providing design solutions to meet those needs underpins good, successful design, with empathy being the crucial element of the design cycle, as suggested by Keates and Clarkson (2004). Every design decision has the potential to include and exclude users, and this decision-making design cycle can be informed by adopting an inclusive design philosophy (Waller et al., 2015).

Ageing Population and Capability Loss

The United Nations predict that by 2050, 16% will be over 65 years of age and those aged over 80 years is projected to triple from 143 million currently, to 426 million (United Nations, 2020). This demographic change will have tangible implications for more inclusive design within the built environment, as more older adults will want to live accessible, barrier-free lifestyles and maintain their independence at home or in residential care (The Centre for Policy on Ageing, 2019). However, capability loss and disability is a continuum that can affect individuals at any time and is not specific to the ageing population.

It is suggested that a 'disability centric' approach currently exists within the design world, creating a threshold between able-bodied and those with disabilities (Chamberlain et al., 2015; Waller et al., 2015). This means that users with multiple, minor capability losses, commonly occurring with ageing (vision, dexterity and arthritis), may not be severe enough to meet the definition of disability, however, they would still experience significant difficulties engaging with the built environment. Both of these developments reinforce the key role of Architects and design professionals in achieving more accessible and inclusive designs.

Architects and Design-Thinking

Design-thinking is an iterative process based on an understanding of user needs, empathising with them and where assumptions are challenged, problems are redefined and alternative solutions are explored (Stanford d.school, 2020). Although, Figure 1 presents the process in a linear configuration, iteration can be conducted at any point within each stage or the complete cycle can be repeated, as iteration is fundamental to good design.

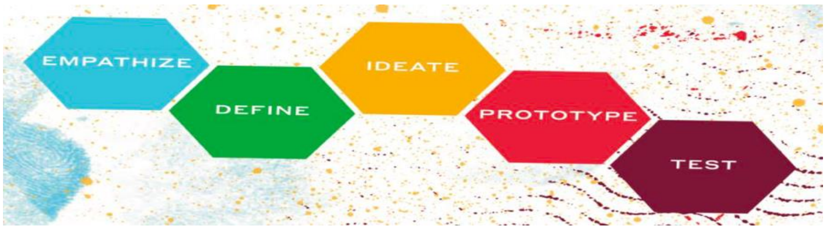

Figure 1:Stanford d-school - Design-Thinking cycle (Stanford d.school, 2020)

Waller et al., (2015) suggests that many designers never meet their users and often only use personas, which are fictional characters to understand their user population. However, other methods such as empathetic modelling, have been suggested by Nicolle and Maguire (2003) and Cardosa and Clarkson (2006), as an effective means of offering designers a brief experience of some of the functional effects of their users' capability losses, by allowing them to briefly 'walk in their shoes' to gain greater insight.

The aim of this study was to investigate whether empathy could be influenced within a cohort of Architects, key design professionals within the built environment. Empathetic modelling was chosen to be the study intervention and by additionally using a pre-and post- intervention validated empathy scale, the effectiveness of the intervention could be quantifiably measured, a metric that did not seem to have been previously reported in the literature.

Method and Study Design

A pre- to post-test interventional study was conducted and analysed using a mixed method methodology, to broaden the scope of the data obtained from a small participant sample. Empathy has many constructs and the challenge in measuring empathy, is that many scales measure 'trait' empathy (empathy as a psychological disposition) rather than 'state' empathy (empathy at a point in time), according to Reid-Searl (2020). However, Levett-Jones et al., (2017) and Ward et al., (2018) suggest that 'trait' empathy scales are not appropriate for pre to post-test studies, conducted over a short period, as they rely on self-report measures of previous experience and behaviours and suggests that 'state' empathy measures should be the focus of educational interventions. Therefore , this study used The Comprehensive State Empathy Scale (CSES) (Levett-Jones et al., 2017), to measure Architects' intrapersonal state empathy at a point in time, following an empathetic modelling intervention, as it had been previously used in educational settings to measure the impact of participants empathy levels towards user groups and was originally based on Batson's (2009) eight dimensions of empathy.

The study provided statistical quantitative data, supported by qualitative data collected from post-task questions and telephone interviews, to gather further insights.

Participants

A purposive sample of eight Architects (Males *n*=6; Females *n*=2) from one Architectural practice were recruited. Architects were considered to be a key representative group of design professionals within the built environment. Participants were only excluded if they had complete visual impairment, as they would not be able to access the task requirements.

Procedure

The study was granted ethical approval by Loughborough University. Participants were sent Information sheets, outlining the study's aims and objectives and their right to withdraw from the study at any time and written Informed Consent was obtained. The project was conducted remotely to take account of the restrictions imposed by the pandemic.

For the empathetic modelling intervention, visual acuity and manual dexterity capability loss, two most commonly occurring capability losses experienced with increasing age, were simulated. Four pairs of the 'Inclusive Design Toolkit' simulation glasses (University of Cambridge, 2020), were stapled together to simulate visual acuity loss and restrictive hand gloves, simulated dexterity loss, were posted to participants, along with the task props. The written, reading and dexterity tasks, were chosen to represent activities of daily living (ADL), along with design tasks and whilst wearing the simulation props, the following tasks were completed (shown in Figure 2);

- Reading a newspaper, medication leaflet and food packaging extracts
- Writing tasks – completing an application form and addressing an envelope
- Dexterity tasks – using a medication posset box and medicine bottle; removing a toothpaste lid and undoing the cellophane wrapping from a post-it note.
- Combined visual/dexterity task – filling a plastic cup with cold water from a kettle
- Design tasks – completing a 2D design sketch and a 3D online design task.

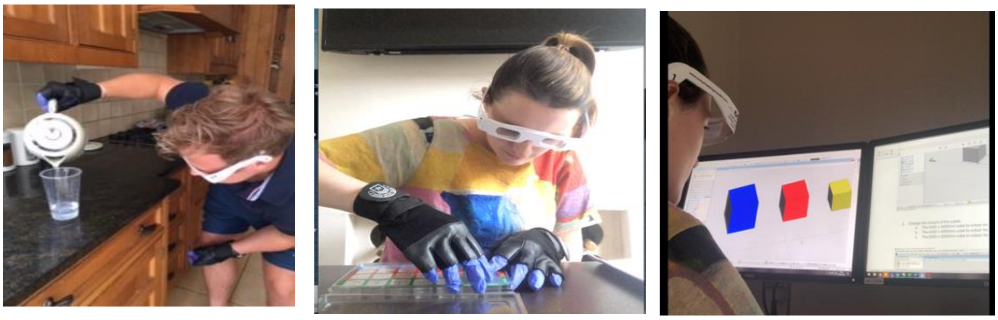

Figure 2- Images of two participants conducting the empathetic modelling

Prior to completing both pre and post-test CSES surveys, participants read a brief persona about Brian, a 63 years old office worker, who experienced visual and dexterity capability loss. Personas are used as representatives of a larger user group and allow designers to focus their designs on their users' needs. 'Brian's' persona, part of the CSES methodology, allowed the Architects to focus their responses by seeing life through Brian's eyes.

Results

Data was collected from eight Architectural participants (Males *n*=6; Females *n*=2), including demographic data, which obtained quantitative and qualitative data for analysis.

Quantitative Data Analysis

All participants completed their pre and post-test CSES surveys, without any missing data. Statistical analysis was performed using SPSS (version 24). A Cronbach's alpha coefficient was calculated and revealed an Overall-CSES value of 0.88, demonstrating good scale reliability. The Shapiro-Wilks test for normality revealed the data to be normally distributed for the pre to post-test Overall-CSES, as the Shapiro-Wilks significance value was insignificant (*p*=>.0.5). This was supported by visual inspection of histograms, suggesting that parametric analysis, using paired-sample t-tests, would be appropriate for the study.

The CSES consists of 30 items, categorised into six subscales of Empathic Concern, Distress, Shared Affect, Empathic Imagination, Helping Motivation and Cognitive Empathy, with Subscales 1-2 forming the CSES-Feelings and Subscales 3-6 forming the CSES-Perceptions. Results revealed that all participants increased their pre to post-test Over-CSES scores ranging between +13-39% - +75.71%, as shown in Table 1.

Table 1: Architectural participants pre, post and percentage increase in Empathy Scores

Architectural Participants								
Participants	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Pre CSES-Overall score	91	127	58	94	113	94	120	70
Post CSES-Overall score	131	144	101	124	131	119	145	123
CSES-Overall pre to post % empathy increase	+43.96%	+13.39%	+74.14%	+31.91%	+15.93%	+26.60%	+20.83%	+75.71%

Overall, there was a positive percentage increase across all subscales. Subscales 2- Distress (+77.77%) and Subscale 3-Shared Affect (+74.15%), had the greatest percentage increase. However, although Subscale 1- Empathic Concern (+18.82%) and Subscale 4- Empathic Imagination (+23.53%), both had a percentage increase, they scored the lowest of the subscales. Subscale 5- Helping Motivation increased by 36.35% and Subscale 6- Cognitive Empathy increased by 46.98% which an overall average increase of 37.81% across all subscales.

Inferential Statistical Analysis - Paired-samples t-test

A Bonferroni Correction was applied giving alpha = 0.006 (0.05 / 9) for each test. As shown in Table 2, results from the paired-sample t-tests showed that four out of six Subscales (Distress; Shared Effect; Helping Motivation; Cognitive Empathy), as shown with asterisks, were significant while Empathic concern and Empathic imagination were not significant.

The other three scales Overall CSES-Feelings, Overall CSES-Perceptions and the Overall CSES Total Score also showed a significant increase (p<= 0.006) in mean scores from pre to post test. Notably, the Overall-CSES mean difference was (31.375) (SD+12.794), indicating a high-level agreement with each survey item.

Table 2: Summary of Paired-Sample t-test results

	Pairs	Mean	Std Deviation	t	df	P Sig (2-tailed)	Alpha,0.05 (Bonferroni Corrected)
Pair 1	Pre-Post Subscale 1 Empathic Concern	-3.250	3.845	-2.391	7	.048	0.006
Pair 2	Pre-Post Subscale 2 Distress	-8.125	3.682	-6.242	7	.000*	0.006
Pair 3	Pre-Post Subscale 3 Shared Effect	-5.625	4.138	-3.845	7	.006*	0.006
Pair 4	Pre-Post Subscale 4 Empathic Imagination	-3.250	2.493	-3.688	7	.008	0.006
Pair 5	Pre-Post Subscale 5 Helping Motivation	-4.500	2.138	-5.953	7	.001*	0.006
Pair 6	Pre-Post Subscale 6 Cognitive Empathy	-6.625	3.662	-5.117	7	.001*	0.006
Pair 7	Pre-Post CSES-Feelings Score	-11.37500	6.84392	-4.701	7	.002*	0.006
Pair 8	Pre-Post CSES-Perceptions Score	-20.00000	10.00000	-5.657	7	.001*	0.006
Pair 9	Pre-Post Overall CSES Score Total	-31.375	12.794	-6.936	7	.000*	0.006

**Significant (p<=0.006)*

Qualitative Data Findings

Qualitative data was obtained from the participants' post-intervention written responses and skype interviews. This was transcribed and thematically analysed to identify key themes from the interventional experience. Following completion of the post-task CSES survey, participants submitted written responses to five open questions, exploring insights gained from their empathetic modelling experience. These responses were further explored with skype interviews. Thematic analysis was then conducted to highlight common emergent themes. Key themes illustrated by the comments below were (1) Challenge: how challenging and eye-opening all participants found the experience, experiencing frustration at the inability to complete simple daily tasks, that previously they took for granted. (2) Influence: The intervention helped change their subconscious design assumptions and how they felt they generally designed for physical disability. (3) Empathy: The intervention highlighted the emotional and psychological toll of having capability loss. Skype interviews were also conducted with three participants, to provide further in-depth insights to support the current findings. Key quotes, illustrating key themes from the interviews are shown in Figure 3.

Figure 3: Key Quotes from Interviews

As shown above, there are clear insights gained, identifying how inadequate current building regulations are for meeting diverse users' needs. It challenged their traditional view of disability, seeing it more as a continuum, effecting a wider population. A summary of the key emerging themes were:

- Inadequacy of the current 'Access to and Use of Buildings: Approved Document M (2020). It only recommends minimum access standards, offering no incentive for developers to go beyond minimum compliance, disregarding end-users' needs.
- With developers often commissioning design briefs, the end user is often unknown.
- In the absence of knowing their end user, they tend to design for themselves.
- They feel there is a stigma associated with accessible designs and reinforces the disability-centric concept of able bodied versus disability designs.
- It challenged their traditional view on disability and capability loss and the current polarised view within design, between 'able-bodied' and 'disabled-users'.
- A lack of inclusive design training within their undergraduate and post graduate training and a desire to include more in their continuing professional development.
- Participants felt strongly that commercial, accessible design decisions, mainly addressed physical impairments.
- All participants reported an increased awareness of the psychological effects of the simulated capability loss, reporting feelings of frustration, fatigue and annoyance.

These results suggest that the intervention gave participants insight beyond the physical impairments created by the capability loss simulation and increased their understanding of how capability loss could influence their users' wellbeing, as they may potentially avoid certain places or buildings that lack inclusive design.

Discussion

The quantitative and qualitative results obtained appear to suggest that Architects levels of state empathy can be influenced and measured. As the CSES was designed to measure intrapersonal state empathy at a point in time, it proved to be an effective and relevant choice for this study's aims and objectives, as significant statistical results were achieved, along with positive thematic insights, demonstrating a universal increase in Architects state empathy levels, post intervention. These results suggest that by using empathetic modelling, as an immersive experiential tool, it allowed the Architects to leave their comfort zone and empathise with their wider user population by 'feeling' and 'understanding' their users' lived experience and better understand users' capability needs. Additionally, recent neuro-psychological evidence, supports the existence of the 'Mirror Neuron' in the brain and supports that 'Empathy' can be taught and developed, further supporting the use of such immersive interventions (Decety and Chaminade, 2003). Key insights were gained which appear to have raised the Architects awareness of how they should incorporate more accessibility and adaptability into their future designs to accommodate users' capability diversity, ultimately aiming to reduce user exclusion within the Built Environment.

Conclusion

This study has shown that an empathetic modelling intervention can positively influence Architects' intrapersonal state empathy and the CSES appears to offer a valuable metric, to evaluate the interventional impact. The qualitative data appears to suggest that all participants gained positive insights to inform their inclusive design-thinking, challenging their current perspective of disability and highlighted the inadequacy of the current accessibility minimum standards within the building regulations.

Impact

Limited research appears to have been conducted to quantify the effectiveness of empathy enhancing tools, even though it is the first crucial stage in the design-thinking cycle. Therefore, this study has shown that by using a simple and easily reproducible empathy scale, the effect of an empathetic modelling intervention, as an immersive learning experience, can be statistically measured and offer significant insights for the Architects empathetic approach to their design-thinking. This low cost intervention, is highly relevant to all Architects and design professionals, both within product design and the built environment. It could be introduced as mandatory continual professional development for design professionals and included in undergraduate training, offering an easy metric to quantify how empathy can be used to keep the design human-centred. Architects, as key advocates of good design, are well placed to communicate the impact of ability loss to others and influence inclusive design-thinking within the built environment and any insights gained can only benefit the reduction of exclusion barriers within the built environment.

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