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# Developing Empathy for Older Users in Undergraduate Design Students

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## Abstract

Empathy has been recognised as a key skill by practicing designers. With rapid changes to inclusivity and accessibility in the transport sector, student designers need to appreciate and understand the way in which people of differing abilities are able to engage with and interact with transport. They need to not only develop an understanding of older and vulnerable users - how they experience products, vehicles, services and systems - but also have the confidence to try out new ways of finding information and gaining 'authentic experiences' to feed into their designs. Although empathic design is encouraged, there is often little opportunity for this to occur in a full educational curriculum.

To meet this need, the authors are developing a framework for teaching empathic design using low fidelity, experiential prototypes – using material that is easily available and affordable to design students. This paper reports the first steps towards designing a brief intervention to increase the empathic horizon of transport design students. It concludes with recommendations on how to create high quality learning experiences for students that will enable enhanced empathic design outcomes as they embark upon design careers.

## Key words

elders, experiential prototyping, design research, teaching, empathy

## Introduction

Empathy is defined as 'the intuitive ability to identify with other people's thoughts and feelings – their motivations, emotional and mental models, values, priorities, preferences, and inner conflicts' (McDonagh, 2008). It is distinguished as *feeling with someone,* rather than *feeling for someone*. Thus, in a fast-developing empathy economy, users search for deeper meaning from their material objects, and functional needs must be enhanced by meeting the ephemeral emotional needs of users (McDonagh 2017).

This poses a problem for young designers, who may lack the experience, knowledge, confidence and (even) interest to design for those who are unlike themselves. Therefore, there is a potential gap between the skills which graduates possess and the needs of industry. Koskinen et al., (2003) concluded that designers need empathy and that this requires making an emotional connection with the user, understanding their situation and why certain experiences are meaningful to them. It is often lamented that there are few opportunities within industry to have 'continual informal encounters with users' (Postma, Zwartkruis-Pelgrim, Daemen & Du, 2012), and this lack is reflected within design education.

As a consequence, a more qualitative approach is needed to inform and inspire designers, to help them understand the personal experience and private context of the 'other' (Mattelmäki et al., 2002; Fulton 2003). This could come about through a number of ways e.g. immersion in the life of the users, design probes, imaginative projection (Fulton 2003; Koskinen and Battarbee 2003). As Battarbee (2004) stressed - the willingness of designers to engage in empathic experiences is key.

In this research, we are looking at ways to provide opportunities for students to build up their knowledge and understanding of people who are different from themselves within course structures. If successful, an empathic design experience can expand students' 'empathic horizon' - used to indicate the limits on a designer's individual ability to empathise beyond certain characteristics of his or her group, such as nationality, background, age, gender, culture, experience and education (McDonagh-Philp and Denton 1999). This can change and develop over time, for example, through training and experience. We want to provide students with the confidence to look at more experiential ways of understanding 'the other' (in this case older people and those with disability) and a set of 'quick and dirty' techniques they can apply in their design work.

Design students typically tend to perceive user engagement experiences/exercises as valuable but are ultimately keen to get back to core design activities such as sketching, concept generation and model making. Therefore, simply providing an empathic design experience is not enough. This will provide students with experience and may help them to empathise with users, but they need to also reflect, communicate and act upon this improved understanding. Consequently, experiential simulations need to be scaffolded within a reflective cycle (Schön 1987) which enables knowledge and meaning to be extracted from encounters and influence design.

## Developing a framework to increase the empathic horizon of undergraduate design students

Collins English dictionary defines a framework 'as a particular set of rules, ideas, or beliefs which you use in order to deal with problems or to decide what to do' (2017). The main aim of our project is to develop methods which can be sued to increase the empathic horizon of designers especially in relation to older and disabled users. There are three classes of tools that can promote empathy in designers (Kooprie and Visser, 2009):

1. Techniques for direct contact between designers and users (research). Whilst it would be extremely beneficial to bring students into contact with real users, in practice the research skills and sampling accuracy needed to undertake meaningful and useful research in undergraduate study may limit this approach, unless the student displays tenacity and commitment to targeting representative users with high quality research instruments. Observational, codesign and living lab models hold further potential. McDonagh runs a course called 'Disability + Relevant Design' which specifically integrates students with disabilities (non-design students), design students with disabilities and design students without disabilities. The course generates an environment of heightened understanding of 'difference' by acknowledging how different lived experiences can significantly impact innovative problem solving. The aim is to design more empathically for all, whilst being guided by those with a different life experience. This course has supported a blind graduate in Industrial Design and an undergraduate student who is a wheel chair user. Not only is design opening up for people with disabilities, it is sensitising design students without disabilities to respect and collaborate with non-traditional life experts to enrich their design outcomes.

2. Techniques for communicating findings of user studies to design teams (communication). Here, experienced researchers and design teams conduct the study, interpret and communicate the user data and findings. This has been advocated as a way to let designers understand the experiences of the user. In this context, the emphasis is not on quantitative data, but on storytelling (e.g. van der Lelie, 2005). Again, it is recognised that there are few opportunities within a design curriculum to facilitate this due to time and resource constraints. Additionally, if there is not direct connection between the research and the students' current projects or interests this may fail to spark interest or imagination.

3. Techniques for evoking the designer's own experiences in a domain relevant to the user (ideation), with designers trying to simulate the user's condition through ideation. In relation to this, a technique which is gaining attention is the use of whole-body simulation suits in design and transport research to provide designers with an immersive empathic experience [e.g. Schmidt and Kekel 2013; and Armstrong, Stone, Immel & Hunter-Zaworski, 2013). Any type of representation designed to understand, explore or communicate what it might be like to engage with the product, space or system has been described as 'experience prototyping' (Buchenau and Fulton Suri, 2000). Focusing on situations allows the designer new insights; rather than looking at user characteristics, they can focus on behavioural or experiential aspects. This technique seems most appropriate for building a framework to increase the empathic horizon of design students who are unlikely to have extensive opportunity to engage and study others in their training.

For this project, we focused on ideation, using a framework based loosely around that of Kouprie and Visser (2009) including stages: 1) discovery, 2) immersion, 3) connection and 4) detachment to

which we have added the pre-stage of receptivity (following Battarbee, 2004 and our own experiences (below)).

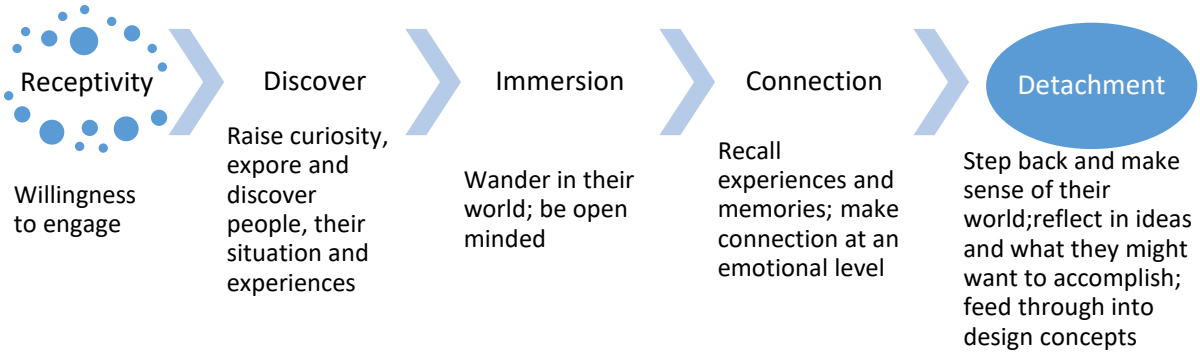


***Figure 1: Empathy framework Kouprie and Visser (2009)***

To support this we have applied Schon's (1987) principles of reflection in, on and through action to encourage students to think more deeply before, during and after their experiential simulations. Time was allowed after each experience for students to verbalise their personal reflection to the group: what they experienced, how they felt, what was different, and how this could relate to their current and future design activities. This was conducted in a structured way – through 'quick writes and with targeted questions supported by group tutorials designed to enable students to share the problems of different disabilities.

The following section provides an account of the way in which we implemented our framework with a small cohort of final year, UK undergraduate design students.

## Implementation

University students tend to have excelled academically to ensure a place on a degree programme. Within the field of design they tend to have excelled in fine art (e.g. painting, drawing) and the craft areas (e.g. ceramics, furniture). The educational experience at university tends to focus on building and developing abilities and skills. This exercise deliberately reduced their abilities and impaired them for the first time as young adults. For young student designers, diminishing their abilities even slightly can have a dramatic impact upon them. The realisation that others may struggle at activities of everyday living becomes a 'felt' realisation.

Following ethical review and consultation with final year tutors it was agreed that we could offer our empathic design intervention as an optional element for students undertaking their final year project. Students could elect to work with us, and in so doing would be provided with extra research material, tutorial support and opportunities to engage in low fidelity simulation of disability and old age. In return they would be eligible for financial support with model making, IP

(where appropriate) and prizes on submission of their final project. The authors made themselves available for tutorials at two weekly intervals, providing additional support with integrating empathic design into the final year project. In addition, social media resources and a web site were provided for students to share and exchange experiences, insights and materials. In this way it was hoped to create an online repository, which would also include 'talking heads' of older people.

The stages were played out with the students as follows:

**Receptivity.** The whole class (of over 50 students) was introduced to 'empathy' with a motivational lecture (delivered by the second author) and the offer of generous financial compensation for volunteers who were willing to use empathic design as a pillar of their final project. Around ten students expressed interest in the programme, even though many were undertaking projects that required knowledge of older or vulnerable users. This was disappointing, but noteworthy. Therefore we have included it as an additional step in our framework.

**Discovery**. The five volunteer student designers, making up the final cohort, were provided with tutorial support, written material and a small classroom immersive experience to raise their curiosity. Material provided included

- Glasses: simulating a variety of conditions, such as macular degeneration and cataracts
- Ear plugs: to reduce hearing in one or both ears
- Masking tape used to tape thumb and forefinger together on dominant hand, and bind three fingers together on non- dominant hand
- Thin gloves to reduce sensation in hands
- Bandages to restrict movement

This involved them trying to read labels/open packages and eat with reduced vision, hearing, mobility and tactile impairments. They further explored this in their home environment. Uploading photos and sharing experiences reinforced group cohesion and added new insights.

**Immersion**. Typically at this stage the designer moves out of his/her office and explores the user's world. As the focus of the project was the design of transport for ageing populations, students took part in a 'walkabout' where they were required to perform all activities involved in travelling from the university to the main rail station, boarding a train to a local station and returning. To support this 'experience prototyping', low fidelity simulations were used, including a range of visual impairment glasses (to simulate glaucoma, macular degeneration and cataracts), mobility impairments (crutches, wheelchair, tape to stiffen legs) and hearing loss. A companion looked after the students and videoed significant moments. On arrival at the destination, students took on another simulation so they experienced different or multiple disabilities.

**Connection.** This was achieved in the debrief sessions. Students were given 'quick note' sheets to record their thoughts before, during and after the experience. They were required to upload and share their videos and talk about their experiences in a group tutorial. Here the student was required to connect with the user by remembering experiences and what it felt like to be in that position.

**Detachment**. This involves the student stepping back into the role of designer, to deploy the new insights into the current design task. As this exercise occurred half way through the design project, it could not shape the initial design. Instead, students were prompted to comment and show how their initial design thinking and concept designs would change as a result of their experiences, for example by placing more attention on visual cues for ingress and egress of vehicles, and look at the overall customer experience of getting on to train.

## Experiencing the experience of another experience

This section describes some of the students' activities and reports in the discovery, immersion and connection stages of the framework.

### *Discovery*

Students were prompted to talk about the problems they experienced as a group and circumstances in which they had felt 'disabled' e.g. when they had broken limbs or were in new cities. Following this they were encouraged to take the material home and try to do everyday tasks in their home environment and share experiences on social media.

***Figures 2 and 3: Low fidelity prototyping in the classroom***

### *Immersion*

## Using low fidelity simulation at home

Following their initial experiential simulation in the classroom, the students were asked to take materials away and experiment on their own to see how impairments might impact on everyday activities. They took the opportunity to explore how different, familiar everyday tasks felt when having restricted vision and mobility, such as making a drink, using the television remote control and getting into and out of a car. The following images are courtesy of one of the students, who restricted his hearing, using earbuds to simulate deafness and tape to restrict movement in his hands and knees (approximating mobility restrictions in arthritis).

***Figure 4: Using everyday materials to restrict mobility and hearing***

He then created a story board relating to the problems he had experienced to inform his own practice and communicate this to the rest of the group. In this case he was simulating how to put shopping in the boot of a car and get into the driving seat.

1. Approaching the car with shopping required a lot of concentration to not drop the shopping bag with reduced strength, mobility and dexterity in the preferred hand.
2. Finding and using the car key. The key was difficult to grasp and pull from the trouser pocket. The restrictions in mobility meant that both hands had to be used to press the button on the key. This was difficult while carrying shopping.

***Figure 5 and 6: Approaching the car***

3. Putting shopping in the car. Opening the boot was difficult owing to restricted movement in the hand made it difficult to squeeze the handle to lift up the boot. Narrow space between the two cars was difficult to manoeuvre in, with restrictions in flexibility of the knees. Putting the shopping in the car would also have required a lot of twisting which would have also been hard for older people.
4. Closing the boot. Limited dexterity caused the task to be more difficult and required a lot more time and focus than normal.

***Figure 7: Using the boot with reduced dexterity***

5. Getting into the car. The student had simulated having limited mobility and stiffness in his legs, reduced sensitivity and dexterity in his hands. Reducing the ability to hear meant that he was unable to fully attend to the road environment, and as such was not aware when cares were approaching, which was an unforeseen hazard. The reductions in dexterity prevented the tasks from being completed in the normal way. Issues shown below related to opening the car, getting into the car and closing the door with one hand.

***Figure 8: Getting into the car***

He concluded that:

*"this was a mountain of a task, it made multitasking very difficult and delayed every task – the whole think took double the time, I became more frustrated as it went on and I even thought about not bothering. This is not an option if you're having to travel somewhere important. I tried to do the task how I normally do it and it was just not possible…..In some cases I was in real danger as I heavily rely on my hearing – something I had not noticed before. But I did not really check for vehicles coming as I'm just so used to listening out for them… The task made me realise that if I were to design for those who are not as abled, things really do need to function well, not just look aesthetically pleasing. The experience needs to be easy and comfortable, not a mission*.'

## Immersion in the real world

The following figures illustrate three distinct student experiences while conducting empathic modelling. Figure 7captures a student wearing glasses that simulate Retinosa Pigmentosa (e.g. tunnel vision) while traveling across the city via train. The first image illustrates the glasses. The second image shows her engaging with the ticket machine interface, which she finds too demanding and resorts to seeking help from a member of the station staff (third image). The final image illustrates how close she needs to place the ticket to her eyes in order to read it.

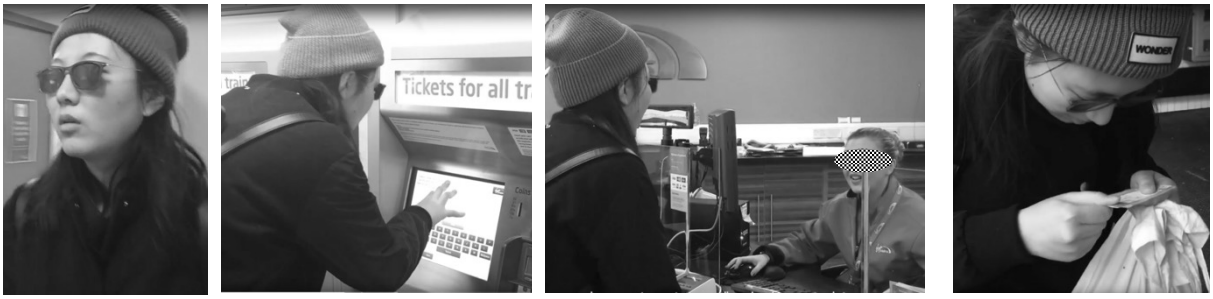


***Figure 7: Student wearing empathic glasses that simulate Retinosa Pigmentosa.***

Figure 8 introduces a manual wheelchair. The student is captured crossing a road, descending a pavement/curb cut, crossing the road and then ascending the payment/curb on the other side (left). The student felt vulnerable during this activity. The second student, again in a manual wheelchair is also wearing empathic glasses (simulating visual impairment) and using a public toilet/restroom. He can be seen washing his hands, with his arms stretched out straight and using the hand dryer. What is important when experiencing a manual chair is the physical effort required to push the wheels and the eye level that this chair affords the user. As abled bodied tall males, they experience a reduce stature.

***Figure 8: Student experiencing a manual wheelchair (left) and wearing impairment glasses while using a manual wheelchair.***

## *Student responses*

The students engaged with this study provided the following insights from their personal experience of empathic modelling:

**Difficulty**: The students found the modelling much more difficult than anticipated - while they were used to developing personas and characterising 'older and vulnerable users', experiencing disabilities first hand seemed to come as a 'shock'.

> "I thought it wouldn't be that difficult."

**Vulnerability:** Students were unaccustomed to feeling vulnerable in a way that a physical impairment made them feel.

> "I felt so inadequate, frustrated and scared";
>
> "Felt everyone was watching me and judging me";
>
> "I felt so incredibly self-conscious and uncomfortable."

**Cultural imprints:** Culture issues came to the surface.

> "It caused a fuss. Being British no one likes a fuss."

**Normality:** The process was also described as disruptive.

> "Disruption from normality."

**Non-verbal cues**: The impaired vision/hearing was also described as restricting situational understanding, which made them feel very vulnerable.

> "I couldn't read peoples' faces… or their intentions."

## Connection

Table 1 summarises the responses of the student to travelling with a disability and their companion. The companion not only ensured that the student was safe, but could also record the problems the student experienced and add their own reflections. In this way, even students who did not wish to fully engage with project could benefit. These reflect the comments in the previous section.

The students reported embarrassment at being too slow or a hindrance when they could not interact quickly enough to buy bus tickets, they felt isolated and scared when they were not able to see people clearly or read their facial expressions. They started to become sensitized to the problems others would have. Some of the views also reflected a weakness of this approach. The students felt self-conscious. They did not have a disability, but were 'dressing up'. This led to some embarrassment.

***Table 1: Example of student responses to the experiential simulation walkabout***

| Student and simulation | Thoughts before activity | Thoughts during activity | Thoughts after activity |
|---|---|---|---|
| **Male sight impaired** | • Nervous after doing something like this before<br>• Confident in my abilities still | • Majority of the time felt self aware and that people were watching<br>• Struggled with depth perception<br>• Frustrated | • Relieved that it was over<br>• Surprised how much I struggled without sight<br>• Helped having bright colours to see steps<br>• Felt nervous all the time<br>• Always planning ahead |
| **Male helper with sight impaired student** | • Interesting to find out how difficult it is to access public transport whilst being impaired<br>• How can PT be improved to accommodate disabled users in the future | • Very stressful, hard to see things such as door handles, screens and people<br>• Had to take a lot more time to think about what to do in the most simplest of tasks<br>• Really struggled to co-ordinate | • Contrasting bright colours would help a lot to distinguish between different surfaces e.g. door handles and door cards<br>• Relieved to have my sight back |
| **Male student with crutches** | • May be a struggle when getting into a black cab<br>• Crutches will be a struggle when walking though the train [sic] | • Very vulnerable and self conscious of other people's views on somebody with a (simulating a) disability<br>• Very tiring<br>• Easy to get lost without any help from other people<br>• Stressful on the wrist | • Disability ramps at station were too long<br>• Bridge seemed too high, no lifts<br>• Bus had no announcements – had to guess when to get off<br>• Lack of signage and illegible signage to those with eye issues was tricky |
| **Male wheelchair user with hearing impairment** | • May not be able to use the wheelchair with the train<br>• Wheelchair could be tiring<br>• Hearing impairment is new to me, not sure what to expect | • Really difficult to use the wheelchair by myself<br>• Poor hearing – less inclined to conversation | • Hearing impairment not a great issue<br>• Couldn't use the wheelchair on my own for more than a couple of minutes<br>• Everybody very helpful |

In summary, the students found that moving through public space with impairment was difficult. Specific issues raised included the length of ramps, difficulties using (seeing) ticket machines, finding lifts and signs, navigating stairs, crossing the road safely. Additionally, students felt vulnerable and fatigued even after a two-hour session. They were relieved to be able to 'shed their disabilities' at the end of the session and commented that they would not feel confident enough to go out alone with their particular disabilities.

Evidence from student comments suggested that their empathic horizon might have changed. They had more insights into why someone walked more slowly, needed support, was unsure where to go, which appeared to translate out of the classroom, and helped them gain new insights into 'how the world actually worked' for people with mobility issues. Additionally this new understanding was reflected in changes to their final designs, which reflected a greater sensitivity to the needs of their end users.

## What makes a good empathic design experience for students?

Empathic design refers to design solutions (e.g. products, services and environments) that satisfy functional and emotional needs of users (customers and/or consumers). Designing a solution without taking into consideration needs beyond the functional (e.g. neglecting the emotional, cultural or social needs) could reduce the effectiveness of the solution from the user's perspective (regardless of how functional it is). The strength of empathic design lies in its raising awareness of 'what makes life rich, personal and meaningful'. Empathic designers need to be able to reflect on and use their experiences to inform their own design and be able to communicate that to other team members. The framework we are building aims to enable student designers to develop these empathic skills, in order to ensure more effective design solutions.

We have demonstrated that the 'real life' experience of disabilities can embed the needs of those with mobility problems within the student thinking process, in a way that may not be replicated by more distant research methods (i.e. reading, observing). Certainly, the students who took part evidenced a sense of shock at how difficult it had been to navigate through their everyday world with an impairment. Despite the shocks the students experienced, the walkabout was also described as fun and relevant to their studies.

Thus, although the students experienced discomfort, vulnerability and frustration, overall this type of learning experience is more likely to 'stick'. This 'sticking experience' could possibly indicate that for design students, empathy is a 'threshold concept', characterized as 'akin to a portal, opening up a new and previously inaccessible way of thinking about something. [It] represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress. As a consequence of comprehending a threshold concept there may thus be a transformed internal view of subject matter, subject landscape, or even world view' (Meyer and Land 2003). This would build upon an emerging thread identified by Osmond in previous research with design students (Osmond et al 2008; Osmond and Mackie 2012).

Students have the luxury of choosing design projects, the design decisions of which should be based on research. First hand research (e.g. through observations, field studies or modelling) whilst difficult to organize with large cohorts may have more long-term value than those, which simply survey classmates and university staff.

Consequently, a good empathic design experience should allow students not only to experience and empathise, but also to reflect, communicate and act upon their improved understanding. Clearly, without a user panel associated with a design course this is difficult. Opportunities should be provided within course structures or students to engage on voluntary work (e.g. helping the community) to build up knowledge of users who are different from themselves. However, such encounters need to allow time for reflection in, on and through research (Schön 1987) which enables knowledge and meaning to be extracted from encounters and influence design.

Meanwhile, for future design projects, it is more likely that they will consider the needs of both current and future users in a way they would not have without this activity. It is hoped that this will become embedded in their thinking, to the point that building in additional functionality (improving ease of use and anticipating users' needs) becomes part and parcel of their design outcomes, regardless of whether the client specifically requested such sensitivity to the users.

## Conclusions

Disappointingly few students were motivated to take part in this study even though it was directly relevant to their projects and the advantages of showing empathic awareness as an employability differentiator were pointed out to them. Additionally, there was a strong sense that the students felt that technological and medical advances would solve the problems associated with mobility in the next 20 years, for example, autonomous vehicles and virtual reality displays. Ultimately their final award needed to demonstrate design skills above user awareness and understanding.

There was some drop out and non-attendance amongst our small cohort owing to conflicting timetabling which meant we were not able to develop a strong, enthusiastic group. The project did require a time commitment on the part of the students and the authors of this paper. On average 4 hours a month were required by all participants to maintain levels of commitment, motivation and guarantee the usefulness of this study, outside of normal activities.

However, despite the low student attendance, those that did take part found that they were surprised by the experiences – as young undergraduate students they were all able bodied and not accustomed to not being able to navigate quickly and efficiently through public spaces. This was particularly evident by their feedback, which showed that they felt more vulnerable than they usually did and also reflected a degree of heightened self-consciousness. This, it could be argued, reflects the general view of vulnerable users as 'other' – who as a perceived small minority - have needs that are routinely not considered in design activities. The students demonstrated the value of

experience in their stated willingness to use modelling for future projects, and embed some of what they learnt into their existing project.

The materials gathered will form part of a growing online repository of video experiences, storytelling and research papers accessible by future design students that will be comprised of personal user experiences from around the world.

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