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FROM CLASSROOM TO CRISIS: APPLYING TEACHING METHODS TO TACKLE DROWNING IN BANGLADESH

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ABSTRACT
Child drowning is a major issue in Bangladesh, with over 14,000 children dying annually, primarily in rural areas with numerous bodies of water. Seasonal flooding exacerbates the risk, especially for children under five who often lack close adult supervision. The Sonamoni project, funded by the UK National Institute for Health and Care Research (NIHR), aims to develop culturally sensitive, sustainable solutions to prevent child drowning. This multidisciplinary initiative is led by Bournemouth University (BU) and the Centre for Injury Prevention and Research, Bangladesh (CIPRB), in collaboration with the University of the West of England, Bristol (UWE), the Royal National Lifeboat Institution (RNLI), the University of Southampton (UoS), and Design Without Borders, Uganda (DWB).
The project included an ideation workshop inspired by the design process curriculum for level 4 engineering students at the University of Southampton. This workshop engaged an international, multidisciplinary team of drowning prevention practitioners, researchers and designers to generate and evaluate intervention concepts using tools like the Crazy 8 ideation technique and lean principles. The workshop proved to be an effective, rapid method for producing appropriate concepts despite the challenges presented by language barriers and participants unfamiliar with design methodologies.
Several promising intervention prototypes emerged from the workshop and are being piloted in northern and southern Bangladesh. The project highlights the potential of educational ideation frameworks to tackle real-world public health crises and suggests broader applications for similar global health challenges.

Keywords: Co-design, Bangladesh, ideation, concepts, workshop

1 AN INTRODUCTION TO SONAMONI
Drowning represents one of the major causes of child mortality in Bangladesh, with over 14,000 children losing their lives annually to drowning-related incidents [1]. This devastating statistic places Bangladesh among the countries with the highest child drowning rates globally. The crisis is particularly acute in rural communities where children under five face disproportionate risk. The geographical and socioeconomic context of Bangladesh, with yearly flooding and numerous water bodies, combined with the challenges of childcare in rural communities, creates a perfect storm of risk factors that demand urgent intervention.
The Sonamoni project - named after the Bangla term for "golden pearl" - aims to address this public health challenge with evidence-based interventions and community engagement. The £1.6 million project, funded by the UK National Institute for Health and Care Research (NIHR), brings together an interdisciplinary coalition of institutions including Bournemouth University (BU), the Centre for Injury Prevention and Research Bangladesh (CIPRB), the University of the West of England, Bristol (UWE), the Royal National Lifeboat Institution (RNLI), University of Southampton (UoS), and Design Without Borders, Uganda (DWB).
While previous drowning prevention efforts in Bangladesh have shown promise, particularly through daycare models, they have had limited impact on children under two, the highest-risk group. The Sonamoni project aims to fill this gap by developing, prototyping, and implementing culturally appropriate, sustainable interventions over four years, working directly with affected communities in northern and southern Bangladesh using design and mixed method approaches.

2 THE DESIGN PROCESS OF THE PROJECT

The Sonamoni Project follows a hybrid process created by the authors and study team. It combines design frameworks like the UK Design Council's double diamond [2] with more intervention-based methodologies such as the 6SQuID process [3] to develop effective and scalable interventions. It contains five phases:

1. Problem Definition & Research, identifying the issue through observations, key informant interviews, literature review, and participatory techniques like focus group discussions, role-playing and user journeys to capture diverse and deep perspectives.
2. Ideation & Concept Development, co-creating solutions with communities and practitioners, applying methods that boost creativity and allow for a structured selection of the best ideas while identifying key assumptions and potential risks.
3. Design & Prototyping, including the use of collaborative tools and techniques to refine solutions through iterative prototyping and "build-measure-learn" cycles with communities, adapted from lean startup methods [4].
4. Implementation & Evaluation, during which the project will conduct pilot studies, gather data, and apply a Monitoring, Evaluation, and Learning (MEL) strategy based on the RE-AIM framework [5] to assess the intervention's impact.
5. Scaling & Dissemination, when findings will be shared with communities, policymakers, and academic institutions.

Other key process elements include securing funding, fostering partnerships, and developing stakeholder relationships to ensure long-term sustainability. This structured yet flexible approach blends fast moving and creative design with rigorous scientific research to create practical and impactful and user centred injury prevention solutions.

This paper focuses on the design and facilitation of the ideation workshop which was a key element of the Ideation and Prototyping stage.

3 DESIGNING THE IDEATION WORKSHOP

With co-creation as a key focus of the Sonamoni project, a five-day in-person workshop was planned, involving injury prevention practitioners, designers and drowning prevention specialists, building on comments and recommendations that had been gathered from the affected communities in Bangladesh during the research phase. This interdisciplinary, international collaboration was considered key to delivering a broad range of practical, context-sensitive solutions, tailored to the socio-economic and cultural realities of Bangladesh.

It was felt that hands-on, interactive delivery and participation methods would maximise engagement and active participation. It was also evident that a heavily structured process was required to facilitate the rapid and extensive generation, evaluation, and refinement of ideas. The authors therefore decided to draw on materials that they had developed for teaching design to level 4 engineering students at University of Southampton (UoS).

3.1 The UoS teaching materials

The School of Engineering at UoS enrols around 700 undergraduate students annually across various programmes, including Mechanical, Maritime, Aeronautical/Astronautical, and Civil Engineering. A sizeable proportion are international students. In 2022, UoS introduced a common first-year module, 'An Introduction to Engineering Design,' to help fulfil new Engineering Council degree accreditation requirements (AHEP4). The module's chief aim is to provide a solid grounding in a rigorous design process based on the double diamond framework.

The design of the module offered many challenges, most notably the large size of the first-year engineering cohort. It was felt imperative that the majority of the delivery should be in-person, particularly as most of the students – many of whom had a background in mathematics and science topics - had had little exposure to design teaching previously. Given the broad range of topics that needed to be covered within the module, and the limitations of timetabling and resources, it soon became evident that most of the topics had to be delivered in weekly 45-minute sessions to groups of 60-80 students at a time. Consequently, the teaching process was designed to be snappy, engaging and packed with content.

One of the module's design workshops focused on ideation techniques, with a focus on improving creativity, non-verbal communication and confidence. The students were introduced to the 'Crazy 8'

design sprint method, when they were tasked with drawing eight radically different solutions to a discipline-specific brief (for example, a moon rover for Mechanical Engineers; a novel musical instrument for Acoustical Engineers) within eight minutes. This exercise was a fun way for students to try and overcome the fear that many of them felt about their lack of previous design exposure and their shortcomings in drawing skills. The workshops also included a range of iteration techniques. Student feedback indicated that the workshops were popular and memorable, with many students continuing to use these techniques in later projects.

3.2 Adapting the teaching materials for the Sonamoni workshop

The authors recognised that there were a number of similarities between the UoS student ideation workshops and the planned Sonamoni workshop:

- The need for rapid concept generation and iteration.
- Participants who are inexperienced in creative tasks.
- Participants who are unfamiliar with design methodology and language.
- A potential lack of confidence in expressing ideas through drawings.
- Potential cultural and language barriers.

However, it was also noted that the Sonamoni materials should be more suited to a peer-peer rather than teacher-pupil relationship, and that the Sonamoni workshop required a broader remit: not just to produce and iterate ideas for interventions, but also to define the initial specification of potential interventions and conduct a sorting process to identify which solutions were most promising. Furthermore, the workshop also needed to be appropriate for the development of non-product interventions.

Using the UoS teaching workshops as a basis, the following structure was devised:

1. Basic high-level design specifications: participants begin by reviewing pre-identified design specifications to align solutions with contextual and technical constraints.
2. Product ideation: participants are asked to draw eight distinct ideas in eight minutes, encouraging creative and unconventional solutions.
3. Non-product ideation: participants are given eight minutes to produce as many written ideas on Post-it notes as possible.
4. Concept selection through dot voting: participants select promising ideas using a dot voting system, ensuring democratic and inclusive decision-making.
5. Concept iteration: selected ideas are further refined collaboratively, incorporating interdisciplinary insights to enhance feasibility and impact.
6. Sorting Ideas Using Lean Principles: The final stage categorizes ideas based on feasibility, scalability, and impact, ensuring the most promising solutions are prioritized for development.

4 THE IDEATION WORKSHOP DELIVERY IN PRACTICE

The five-day workshop took place at Bournemouth University and the RNLI headquarters in Poole, UK in July 2024 with 13 attendees from Bangladesh, the UK and Uganda. Following an initial presentation and analysis of potential interventions that had been previously drawn up following extensive research and community workshops in Bangladesh, the participants were grouped into four multidisciplinary teams, ensuring a holistic approach combining design thinking, social science insights, and engineering expertise. Each team contained an experienced design practitioner to help guide the process.

The long list of potential interventions was arranged into eight categories, four product-based and four non-product-based. Two categories were assigned to each team to create high-level design specifications that set the contextual and technical parameters. Each specification was then presented to the entire group for discussion and revision. Once agreement had been reached, the ideation and iteration process began, focusing on the product-based categories first.

4.1 Product ideation and iteration

Despite coming from diverse backgrounds and having varying levels of ability, experience and confidence in sketching, the teams were successful in producing a wide range of concept ideas (Figure 1). Each team focused on one category and participants were encouraged to discuss and explain their ideas to refine and develop concepts further. Following the initial eight-minute ideation sprint, all teams were given a further ten minutes to view the other three categories and add any concepts they felt were missing. This allowed for a more comprehensive and well-rounded approach to the ideation process.

Figure 1. Product ideation with dot voting

Figure 2. Non-product intervention ideation

For selecting concepts for further iteration, the 15-minute dot voting session – where individuals placed coloured stickers on the ideas that they found most promising - was a simple and speedy solution that also encouraged participants to rely on their gut instincts as well as specialised expertise. This intuitive, quick-response mechanism allowed for a democratic selection process, where immediate, instinctive reactions could spotlight innovative ideas that might have been rejected or overlooked during a more prolonged, expert-driven deliberation. By tapping into collective opinion, the workshop harnessed a blend of spontaneous creativity and informed judgment, reinforcing that sometimes an immediate, visceral response can be as valuable as a detailed analytical review.

Teams then swapped categories and decided which three concepts to advance, guided by the dot voting results. Swapping categories was considered an important part of the process; to reduce bias any participants may have for their own concepts. Within a 20-minute time limit to encourage focus and efficiency, each participant worked on creating iteration sketches for one selected concept, generating as many variations as possible while keeping the core idea intact. This stage encouraged creativity and refinement, exploring multiple possibilities within a structured framework.

4.2 Non-product ideation and iteration

Once the product ideation and iteration had been completed, the workshop moved onto the non-product categories. This was a repeat of the product-based process but instead of sketching, teams used written Post-it notes to generate ideas (Figure 2). Dot voting was again used to help narrow down the range of concepts. During the iteration phase, participants documented more detailed variations for each of the three chosen concepts, to encourage broad exploration of alternative solutions, as well as clarity and flexibility in approach.

4.3 Intervention selection process

A total of 25 distinct possible interventions were produced during the ideation and iteration phase of the workshop. As this number was too large to take forward to the prototyping stage of the project, an intervention selection process – based on lean principles – was planned to sort and prioritise the ideas based on value, impact and scalability, with an additional rating for development cost and effort. However, before the process was undertaken a poll was taken of the ‘gut feeling’, where the participants were asked to vote for their most favoured interventions, based on their knowledge of the country and users and past experiences. Following this, the lean selection process was undertaken. As table 1 shows, there was a significant correlation between the top scoring interventions for the two methods, with eight of the top ten interventions appearing in both lists.

Table 1. Ranking of the top ten chosen interventions using gut reaction and LEAN methods

Ranking	Gut Reaction: Best interventions	LEAN: Best scoring interventions
1	Upskill community in first response	Adapt existing daycare centres
2	Adapt existing daycare centres	Face-to-face awareness meetings
3	Awareness-raising events	Soft moveable pop-up playpen
4	Soft moveable pop-up playpen	Moveable swing with shade
5	Moveable swing with shade	Upskill community in first response
6	Self-closing door barrier	Self-closing door barrier
7	Redesign water storage container	Move latrine latch out of reach
8	Face-to-face awareness meetings	Self-closing latrine door/latch
9	Self-closing latrine door/latch	Awareness-raising events
10	Piped water from tank	Locally made rescue equipment

The blend of intuitive, gut-based voting and methodical refinement provided a balanced approach that leveraged both immediate insights and detailed analysis. This method ensured that the seven most robust and appropriate drowning interventions were earmarked for further prototyping and testing. These ranged from information campaigns and community training to product-based interventions such as locks and barriers. The interventions chosen reflected the expert input of the participants and were tailored to the unique socio-economic and cultural conditions in Bangladesh while also reinforcing the value of interdisciplinary collaboration.

5 REVIEWING THE WORKSHOP

The Sonamoni project's five-day workshop proved an effective tool for harnessing the knowledge and experience of international experts to address Bangladesh's child drowning crisis. The workshop successfully repurposed and adapted the same techniques used for first-year undergraduate design teaching, encouraging rapid ideation from multidisciplinary teams representing design, social science and engineering perspectives. In-person, face-to-face collaboration was considered to be particularly instrumental in the success of the workshops, and it was felt that remote or hybrid participation would have severely hampered the process.

Participants collaborated effectively to generate 25 distinct interventions, which were then evaluated through both intuitive voting and structured lean principles. Remarkably, eight of the top ten interventions appeared in both assessment methods, validating the strength of the selected ideas. The seven finalised interventions - ranging from community training to physical barriers - reflect culturally appropriate solutions tailored to Bangladesh's unique context and supported by communities.

For future ideation workshops the authors would suggest these recommendations**:**

1. Enhance Creative Thinking: Creativity proved challenging during ideation sessions, resulting in a lack of truly innovative or disruptive ideas. Future workshops should incorporate dedicated sessions specifically designed to boost and encourage creative thought in the abstract rather than concrete.
2. Designate an Administrator: Important dialogue and decision-making details were lost during some of the process. An administrative role should be established to thoroughly document activities, conversations, ideas and conclusions throughout the process.

6 CONCLUSIONS

The Sonamoni ideation workshop played a key role in generating innovative, community-centred ideas for interventions to address childhood drowning in Bangladesh. By combining design methodologies used in an educational environment with traditional injury prevention tools, the workshop facilitated a dynamic and inclusive environment. This enabled diverse stakeholders, from injury prevention specialists to designers and social scientists to work collaboratively with community input to develop, evaluate, and refine potential solutions.

Ideation techniques such as the Crazy 8 design sprint, dot voting, and structured iteration, enabled rapid concept generation while ensuring that ideas remained grounded in cultural, technical, and practical feasibility. The balance between creative exploration and systematic selection - combining gut reaction

voting with a lean-based evaluation - allowed for a rigorous yet flexible approach to identifying the most promising intervention ideas.

The structured yet adaptive nature of the process ensured that participants, regardless of their background or design experience, were able to contribute meaningfully to the development of ideas. As part of the ongoing study, these ideas will be developed into minimum viable products (MVPs) to be introduced to communities to test the key assumptions identified. Iterative feedback from communities will then help refine the ideas to ensure that they provide value and impact and can be suitably scaled.

It is the intention of the authors to further develop the ideation workshop process and create a set of easy-to-use tools. This will form part of a wider developed framework that will be usable by injury prevention specialists globally to create sustainable and optimal interventions. It is also the intention of the authors to feed this developed process back into education, thus creating a full loop of social learning.

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