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THE ROLE FOR AI IN A COIL PROJECT INVOLVING FAST FASHION, PERSONAL FLOATATION DEVICES, AND A LMIC COMMUNITY

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ABSTRACT
This paper explores the use of artificial intelligence (AI) in collaborative educational design projects across three continents, interfacing fast fashion with design standards to produce affordable and functional life-saving interventions for artisanal fishing communities. The paper details the methodology of three educators from Germany, Canada, and the UK in co-designing a project brief using AI-generated prompts. Each author explored the use of AI with an agreed initial prompt and how much effort they had to expend to correct the generated brief with further prompts. An evaluation matrix was used to determine the effectiveness using key criteria such as technical accuracy, logistics, alignment to learning outcomes and feasibility. The discussion and conclusion propose a need for a model and framework for use in the application of AI in the development of content for educational projects and investigation into the efficiency of the process. Next steps refer to the authors' intention to run the proposed COIL project in 2025 to test the outputs generated to ascertain if they meet, not only the needs of educators and students but most importantly the beneficiaries of the interventions produced.

Keywords: Personal protective equipment (PPE), extreme textiles and co-teaching, COIL learning formats, AI, design methods, LMIC and integrative design

1 INTRODUCTION
Balancing collaborative design learning formats is extremely relevant to emerging EU regulations and new 'EU Standards' by the European Parliament (Green Deal and the Green Claim Directives). Extreme textiles and new bio-based material-design, represent only one case of businesses in design that focus on the provision of functionality. These are countered with fast fashion-based textiles and their prevalence in society and problematic performance and abundance. Within this frame, our aim is: scoping a transcontinental collaborative design project for student groups to support experimenting and learning across three continents – using AI in textile design engineering - for creating with different methods across different competency levels. This submission provides the background, process, and scope for a Collaborative Online International Learning (COIL) design project involving intercultural design skills, that seeks insights to: What is the role for AI in integrative design? What difference does it make in this context?
Defining the project across three continents is a challenge that requires navigation of learning and designing formats, alongside rapidly emerging technologies (AI). The role of AI in design project development and project management will be researched, by experimenting and comparing different generative design methods. Within the post-digitalisation phase, we could have taken benefit from interlinked learning landscapes [1], providing the technical frame for working intercontinentally across and within students design groups, but the reality of undertaking this project will be the proof. And we realise the need to extend collaboration to AI since the speed of development of AI-based creation tools is faster than the training of scholars, students and teachers in the modified media landscapes within the universities. [2]

2 BACKGROUNDS

Artisanal fishing communities in Lake Victoria Tanzania experience very high drowning rates. Research on Lake Victoria carried out in 2018 showed very high levels of drowning amongst communities living around the Tanzanian shores of the lake. Here the average drowning rate across all villagers is found to be 231/1,000,000, and if the population is narrowed down to fishers, it reaches a rate of 1,505/100,000[3]. The results of research undertaken to date and discussions with key stakeholders including those most affected by drowning, reveal the highly risk-based behaviour response to fishing as a livelihood amongst marginalised and small-scale (artisan) fishers.

Affordable and sustainable quality lifejackets, which are widely evidenced globally as a risk reduction intervention are not available to the fishers and The Royal National Lifeboat Institution (RNLI) is working with partners in Tanzania to design and develop solutions that address the high burden of drowning amongst artisanal fishing communities.

The RNLI is leading the creation of a bespoke design process to create interventions to reduce the risk of drowning. Combining both traditional research methodology with human centred design tools, a process has emerged which brings together all those with an interest in a problem and allows them to work collaboratively to create sustainable solutions. One of the authors professional practice roles (at the RNLI) is leading a project to address this need for affordable buoyancy and with contacts made at E&PDE is scoping a multi-institution student collaboration 'COIL' project with the remaining 2 authors institutions. It is hoped that this COIL project will not only inform the issue but also allow students from 3 different countries to work with community stakeholders, drowning prevention practitioners and fashion and textile experts.

Community and government stakeholders have agreed that, as well as addressing the need for a lifejacket that is designed and manufactured to international standards, at-risk communities should have access to resources that enable them to produce personal and group buoyancy devices locally.- Communities have welcomed the idea of using several water bottles incorporated into a fabric shell to provide this solution and it is with this in mind that the idea to link fast fashion with technical buoyancy came to the authors. Fast Fashion and protective apparel are an unlikely coupling, and ethically incompatible in the long term, but in the context of this paper, the authors consider the supply chain of fast fashion textiles. The reduction of fast fashion consumption and responsible spending behaviours among consumers has both microlevel and macrolevel implications [4]. While the fast fashion industry continues to feed a mass audience, only a few consumers possess a comprehensive understanding of the harmful effects of fast fashion on the environment [5]. Research shows that young adults aged 20 to 26, are motivated to express uniqueness through fashion, while being cost-conscious, which leads to compulsive buying habits [4]. The starting point for this design project in protective apparel is primarily to address an in-country need to reduce the risk of drowning in Tanzanian fishers, while secondarily raising awareness of the impact of these buying behaviours in a global context.

Today, within the fields of 'design engineering – in special textile design engineering' discipline, creating with AI only in CAD-systems as 'conventional trained' at this moment. Questions about the power of AI co-pilots, and who would feed faster and more data for textile engineering, that prompts could be used soon, are in our time. Everybody could use Chat GPT, but how to use this in a resilient, beneficial manner? And if we, as three teachers, with different expertise and background are collaborating with AI, who will evaluate to what kind of technical accuracy, contextual validity and presentation? All this didactically, pedagogically and strategic perspectives have to be analysed and reflected for the academic purpose and at the same time for project management perspectives for creating extreme textile design solutions - within complex conditions [6].

Why COIL? For this collaboration, the authors embraced this initiative for its approach that brings students and professors together across cultures to learn, discuss, and collaborate as part of their class. COIL enables students to foster their global competencies through an intercultural learning environment that links classes in different countries. Using various communication technologies, students from different countries complete shared projects, with faculty members from each country co-teaching. With COIL, Educators work together to define the learning goals, the length of the interaction, the comparative and collaborative activities, methodologies and tools, and how student learning will be monitored [7]. This scoping paper in 2024, will make some experiences with Chat GPT for AI generated briefings and reflecting these to be continued with COIL project in 2025: In 2025, for all three student groups - from three different countries - we will give briefings and intro based on this pre-generated design project, brief generated with Chat GPT 2024.%

3 EDUCATOR METHODOLOGY - CO-DESIGNING

Many studies have indicated an increase in the workload of academics. Jordan & Layzell [8] suggested that academic staff in Arizona work on average 50-60 hours per week, which includes 30 hours of teaching. This suggests that any way of reducing the amount of time spent on non-teaching activities as well as ensuring high quality curricular outputs, would be welcome. Educators spend a lot of administrative time and effort designing design briefs, yet they also express their teaching style and pedagogical approach. Thus, raising the questions; how much confidence do educators have in AI to generate design briefs, including technical accuracy, contextual validity, ethics, logistics and presentation. The 3 authors set out to design a project brief via AI that addressed the following needs:

- Benefit a real-world problem given by a 'live brief' (sustainable and effective buoyancy)
- Utilise the expertise of the authors and students from each academic institution
- Remove ambiguity and satisfy the learning outcomes for each unit at each academic institution

A hypothesis based on the Authors' research, experience and assumptions, could read: providing AI with more information through prompts generates a higher fidelity brief. In this context - technological fidelity is relevant - addressing the degree of correspondence between the input and the output and the time and energy required to achieve a 'prototype' brief. For the purpose of this paper, the authors sought to address the fidelity of the brief by evaluating for accuracy, feasibility, ethical and cultural relevance, structure and logistics. A 10-point framework using a rating of 0 (strongly disagree) to 10 (strongly agree) was developed and applied to each statement, by each author. Cumulatively, a higher score overall would translate into less time needed to 'revise' the brief prior to use.

Basic prompt:	Additional prompts:
Prepare a design brief for a group of 20 design students in each of 3 different countries to address the problem of buoyancy for Tanzanian fishers using fast fashion materials.	- The equipment designed should be able to be manufactured in Tanzania. - The project should be designed to be completed in 7 weeks and suitable methods identified and assessment criteria produced. - Fishers from Lake Victoria Tanzania will be available to answer student questions throughout the 7 weeks.

The following section outlines the characteristics of each educator, their student group, and how they applied the prompts. The results of their evaluation are presented in the section following, in addition to the insights generated.

Author 1 Profile: The expertise and competencies of German teacher reflects the perspective of ongoing handling in this topic and gives reason for the academic ongoing: The background expertise as industrial designer and master tailor for textiles since 30 years, consultancy of sustainable material design since 20 years and as teacher since more than 15 years, argues for interdisciplinary designing in all design disciplines, and arguing for hands on designing in balancing with digital helping media [9]. Author 1 is an academic researcher, professor about design theory, with focus on sustainability in design /-education and with focus on textile applications in all design disciplines. The interdisciplinary interlinking design methods are of interest in the European design field. [10]

Method: Author 1 used evaluated design methods and adjusted them by looking at human embodied experiences and cultural background. Designing experiences' by Rossman and Duerden [11] supports that we as *human designer* (Wachs) have to shape the AI instruments, before they will shape us [12]. By designing experiences with experiments and comparisons, design thinking combined with hands-on designing: this interdisciplinary complex process is the reason that the German group of design stakeholders sought to compare the ONE prompt generated for all three groups in advance) for the AI-generated brief for the design task with analogue design management processes. In addition, it is pedagogically significant, when the students gain knowledge by didactically evaluation, to reflect on comparing the analogue generated brief with the Chat GPT AI-generated brief. Author 1 used https://chatgptx.de/ because it is free and does not require registration.

Author 2 Profile: Author 2 is an academic in soft and hard product design and engineering at a Canadian university. The author's professional practice and research area is in the technical field of design for extreme environments and human resilience in the face of the changing climate. Projects to date include cold water extrication, passive thermal rewarming and various protective equipment for high-risk environments. The students are undergraduates completing a 4-year degree program with industry

involvement and a focus on hands-on prototyping, material and usability testing, sustainability and manufacturability (technical packs).
Method: The author 2 first carried out an early 'scan' of the topic; AI-generated 'background' content, using the relevant keywords framed into questions an Educator asks students in the early stage of scoping a project; such as: Q1: 'how do fast fashion and buoyancy relate'; Q2: 'what materials are used in personal protective equipment for fishers'; Q3: 'what textiles are available in Tanzania'; and, Q4: 'what are the materials of fast fashion?' The author then used the group-agreed prompt guidelines. Content was generated via AI sources (https://chat.openai.com/).
Author 3 Profile: Author 3 is an academic in design and engineering at a UK university. The authors professional practice and research area is in the technical field of international drowning prevention where they currently lead projects including the reduction in risk for Tanzanian artisanal fishers and preventing drowning of newly mobile under 2-year-olds in Bangladesh.
Method: The author 3 used the group agreed prompt guidelines and first searched for literature that provided best practice in this area. Eager, B., & Brunton, R [13] provide some guidance in their paper on prompt methodology and the author adapted the prompt.

4 CO-EVALUATING AI: RESULTS AND KEY INSIGHTS ARISING

In Table 1 we provide the framework and results for evaluating and exploring the possibilities of Chat GPT for textile design/ing multi-country project briefs solutions in the future; *How much effort does the educator need to expend to correct the AI generated brief and is it worth it?* How is it responsive to the problems identified (fast fashion, life-saving buoyancy devices for Tanzanian fishers) while speculative of new applications? Other parameters include the Sustainable Development Goals (SDG's).
Author 1 Insights: On the one hand, we are looking forward to evaluating the 'correct' data, resulting in design solutions, created by AI. On the other hand, AI is an effective helping hand for designing complex solutions - not only for buildings in architecture [14]. It seems to be time efficient -with restriction by trial and error, it seems to be a democratic tool, when everybody gets access to open AI, it is bridging the geographical gaps and supporting diversity and togetherness [6]. But we have seen as well, that by integrating ONE defined prompt in one same software tool (open AI) we got different solutions, different structures of the design brief. And the question raises: what about the evaluation, who will decide that ethical [15] and technical correct data could be extracted by the result? This has to be discussed further for a practice-based project, and specifically for the project scoped in this paper, across three institutions, countries and two continents with different policies and procedures.

Table 1. Evaluation framework for the AI-generated briefs using 0-10 point scale (0: strongly disagree to 10: strongly agree)

"The Design Brief …"	Author 1	Author 2	Author 3
… is technically accurate.	6	7	7
… aligns to SDGs	9	5	5
…addresses contact hours and course logistics.	8	8	7
… is clearly scoped.	8	7	6
… is implementable.	5	8	8
… is feasible.	8	7	7
… addresses cultural aspects relevant to the project.	9	8	7
… mediates knowledge about extreme textiles.	9	8	8
…meets ethical requirements.	3	5	5
…provides structure and the presentation is clear and explicit.	8	9	8
TOTAL evaluation score /100	**73**	**72**	**68**

Author 2 Insights**:** The cultural context of the brief wasn't addressed by the basic prompt and required further details to incorporate full relevance of designing for/with Tanzanian fishers. The timeline in the AI generated brief was set at 15 weeks with the basic prompt and only reset to 7 weeks with the added prompts, which raises questions about the scoping of projects and their feasibility within the collaborating institutions against the meta-content from which AI draws. Deliverables shifted substantially, but not necessarily more relevant, despite the expanded prompts. With a single basic prompt statement, issues of scalability were included through a sustainability report, which was not included once expanded prompts were added, thus educators would need to review these carefully.

Author 3 Insights: The first agreed iteration of the AI prompt used was surprisingly good with suggested itinerary, outputs and assessment criteria close to what the BU author would of suggested, however the AI missed or assumed that the students would have knowledge of the technical buoyancy requirements of artisanal fishers and the technical understanding of buoyancy as a force. Further prompts were used to refine the brief, including; "*Design a schedule for the above allowing the students to spend 8 hours per week on the project*." Either the AI didn't understand the further prompt or the author didn't write the prompt in the correct format. It was found that changing the prompt was more effective than adding additional prompts after the fact. The author also noted that more emphasis should be placed on the structural and buoyancy properties of the product and the iterative testing for this.

Returning to the core questions: What is the role for AI in integrative, intercultural design? What difference does it make in this context? Does It extend beyond logistical challenges to address EN/ISO standards vis a vis affordability/sustainability? Sharing methodologies on the development and application of AI prompts, and then discussion of the emergent brief, generated high levels of reflectivity on issues of educator confidence, fidelity, intellectual property, quality and ultimately did the AI help with collaborations and refereeing between the educators? Is there a need for a proposed model and framework for use in the use of AI in the development of content for; a LMIC community needing buoyancy solutions for fishers (SDG 3+14)? How Does it reflect intercultural design skills (SDG 5 +17).

5 DISCUSSION AND NEXT STEPS

The design didactic purposes of this COIL-scoped project are to be applied to master and bachelor students, in cohorts of 10 to 25 participants, who will design together, using co-creation methods [16] in multidimensional working locales to support new design competences. Students will be invited to experiment with prompts and reflect on the outputs alongside hands-on textile repurposing for protective equipment, alongside new extreme textiles of buoyancy, will provoke the students to lean into the humanity of extreme environmental conditions. Design through multidimensional working stations (hands on designing, prototyping, scoping with Rhino, and Chat GPT) the students will: analyse Tanzania's fishers working conditions and safety needs for buoyancy alongside the availability of textiles resulting from fast fashion dilemma (from landfills, filled by European fast fashion transfer, to collecting institutions).

In the next step, the co-authors will develop an AI generated collaborative project in REFLECTION on the decisions that should be made for sustainable material performances - for extreme textiles - with ethical new standards [6]. By collectively adopting collaborative design formats (as supported by COIL) for inner-student groups, and for across cultural institutions, countries and continents - we aim to further develop 'cross cultural learning landscapes' [17] because 'working in interdisciplinarity within a new research field today generates a new discipline of tomorrow' [1]. This approach to integrative design [18], involving reflective insights into how to bridge the challenges in different understandings, different perception of material and cultural behaviours, is also a first step in addressing perceptions of different ethical values, while also providing an opportunity to investigate the role of AI in creating new ethical standards in designing transcontinental solutions for humanity [19] projects across cultures.

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