Incremental hackathons as a participatory design process for AI in public health and education

Case study: F'AI'R Education Hackathon Series

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Introduction

We present a participatory design and build cycle for AI in public health and education, in the form of a series of hackathons designed to explore AI systems with HCI design. The hackathons are supported by the UK Science & Innovation Network at the British Embassy in Paris, the United Nations ANCSSC, X5GON and UCL's Industry Exchange Network at UCL Computer Science. Students at several international universities have taken part in a rapid approach to a systems development life cycle, from an early requirements capture process, leading into a high fidelity design finally developing a working prototype AI system that supports the given theme.

Context

The main theme of the G7 French Presidency in 2019 was fighting inequalities. A number of countries are developing Open Education with AI to bring fairness to all corners of the globe. The ability to generate dynamically created educational courses based on each region's needs will lead to a number of innovative pedagogical solutions that build local and sustainable capabilities and foster next generation learning skills enhanced with AI.

The aim of this series of hackathons is to progressively strengthen minds in a syllabus-matched driven approach to HCI education and enable students to present rapid ideas using a growing succession of hack events. The passion to build and deliver innovative and impactful solutions to real world issues were matched to three major themes, access to education and public healthcare, capacity building and knowledge exchange in developing countries. The solutions for the final hackathon event account for multilingual and literacy needs alongside various types of educational bias.

As part of NGO mentorship received by the students, the United Nations supported Alliance of NGOs & CSOs for South-South Cooperation (ANCSSC) developed ten hackathon categories to align with these three themes and the 17 Sustainable Development Goals (SDGs):

Educating governance in NGOs/CSOs	Skills and Health Education for Street Youth and the Homeless
Supporting the organisational growth of NGOs	Digital Education, Literacy & Refugee Children
Advocacy tools on climate action for NGOs	Women Co-operatives, education for girls, equality in gender investment
Refugee Integration	Teaching Water and Energy Management
Sexual Reproductive Health and Rights (SRHR)	Implementation and management of Sustainable Projects

Table 1. ANCSSC Hackathon categories based on 17 SDGs

Hackathon Process

The pedagogical view of the hackathon process is part the University College London's Industry Exchange Network (UCL IXN) [1] teaching methodology, in particular the Scaffolding, Discovery and Innovation chart [2] demonstrates the key learning stages that build up iteratively to engage the students with growing levels of project based learning tasks with real world problems and clients. This methodology has developed over 9 years of project based learning with industry projects for up to 1000 students each year at undergraduate and postgraduate levels in Computer Science.

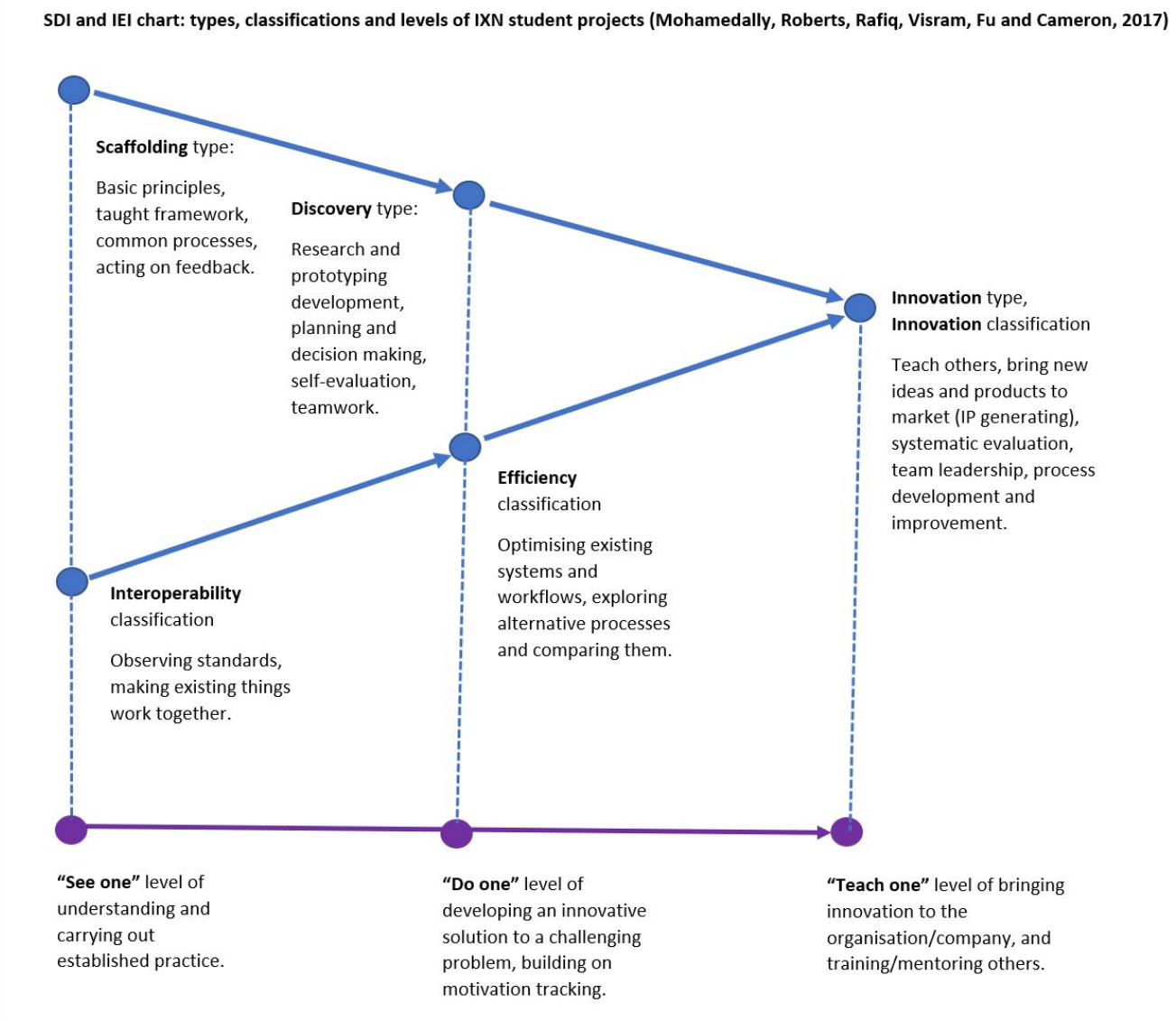

Fig 1. SDI and IEI chart (Mohamedally et al. 2017)

From this model, 4 Hackathon Events were designed in this series. The first three took place locally at University College London and with similar events running in parallel at three European universities: Universite de Nantes, France; Universität Osnabrück, Germany; Jozef Stefan Institute, Lijubljana, Slovenia**.** The three winning teams at each university thereafter were selected to compete in a final Hackathon Challenge based at the British Embassy in Paris.

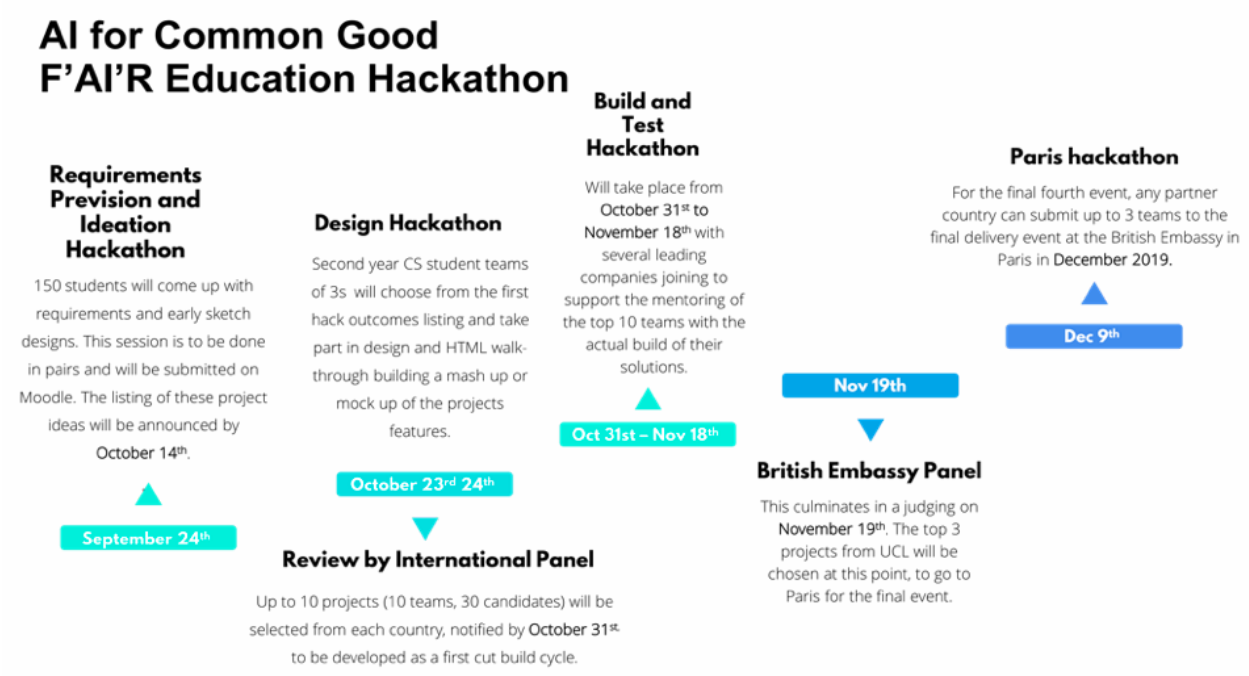

Fig 2. Provisional roadmap for the series of hackathons at UCL

For the first event, 150 Computer Science undergraduate first year students took part in a Ideation and Prototype Sketching session as part of their Scaffolding level of learning, to come up with proof of concept ideas and early sketch UI designs based on the UN's Sustainable Development Goals. In this challenge they were asked to bring in their current ideas of what AI in public health and education should look like. During the second event, Design Prevision as part of their Discovery level of learning, 147 Computer Science undergraduate second year students formed teams of 3, where they took part in high-fidelity design and HTML walk-throughs, building a mash up or mock up of the projects features and producing a github

repository of cloud based demonstrators. The third event, a Build and Test Hackathon steered their second iteration of Discovery level, and was conducted over 48 hours with several world leading companies joining to support the mentoring of the teams with the build of their solutions with evaluation of public health, education access for all and sustainability as key topics.

For the final fourth event, centred around the best projects that are at Innovation level, the partner universities up to 3 teams each to the final event at the British Embassy in Paris. The teams took part in a final Hackathon in Paris where all of the European teams competed in a new one day Open Education and AI challenge that was presented back to a judging panel of AI, Health and Ethics experts on Day 2.

The judging panel looked for a polished product and pitch. The projects were judged based on the team's ability to meet user needs and develop a functioning, responsive API. The teams were judged on explainability, transparency and their understanding of the limitations of their data. Judges will be guided by judging criteria devised specifically for this hackathon series and derived from UK government code of conduct guidelines, data ethics principles and Human-AI Interaction HCI guidelines.

Novelty of this approach

Hackathons as a growing phenomenon and participation tool have been widely debated across the CHI community. Alongside praise for the collaborative strength of hackathons to imagine new possibilities for technology sit concerns about the 'hack culture'. Short-lived and time pressured, the brevity and competitive nature of a hackathon itself can reduce the opportunity for personal learning [3,4]. Beyond a single hackathon event, this series of four hackathons aims to support creative endeavour and skills development in lieu of a 10 week lecture course. The successive nature of the series of four hackathons affords a method through which university students participate in AI design as a competitive, iterative and educational process but with reflective practices, situated modelling and ultimately, presentation of results for real world engagement.

User needs User needs are the needs that a user has of a service, and which that service must satisfy for the user to get the right outcome for them. Services designed around users and their needs: are more likely to be used[1] Score out of 10:	Guiding questions ❑ Does the team understand user need and how this solution may benefit the public?[1] ❑ Have the team made clear what the system can do?[3] ❑ How does this align to a Sustainable Development Goal?[4] ❑ Does this match relevant social norms?[3] ❑ Have the team defined the outcome and how the technology will contribute to it?[1]
X5GON API review and Explainability: API stands for Application Programming Interface, i.e. API is the way for an application to interact with certain system/application/library Explainability suggests that AI and systems that collect data and make decisions about people, provide explanations that lay people can understand[2] Score out of 10:	Guiding questions ❑ Have the team showed what type of algorithm is being developed or deployed?[1] ❑ Does the X5GON API work? Is it functioning and responsive? ❑ Could you clearly explain why you need to use this data to members of the public?[2] ❑ Is there a less intrusive way of achieving the objective?[2]
Fairness, Transparency & Accountability: Fairness refers to impartial and just treatment or behaviour without favouritism or discrimination[2] Transparency refers to the extent to which a system makes its decisions visible and how they were derived[2] Accountability refers to making clear how decisions are made from the datasets to enable people to believe they are accurate and correct.[2] Score out of 10:	Guiding questions ❑ Has the team been fair, transparent and accountable about what data is being used?[1] ❑ What data sources are being used?[1] ❑ Did the team make clear why the system did what it did and how well the system can do what it can do?[3] ❑ Does the team understand the limitations of the data?[1] ❑ Are there plans in place to identify errors and biases?[1]
Summary Comments: Overall Score out of 35 [1]Code of conduct for data-driven health and care technology (Gov.uk, 2019) [2]Data Ethics Principles; Fair, accountable, transparent and explainable (FATE Framework) [3]Guidelines for Human-AI Interaction, CHI'19) [4]Sustainable Development Goals	Extra marks (5): ❑ Did the team deliver a polished product and pitch ❑ Was the X5GON API demonstrated? ❑ Has the team taken extra consideration for inclusivity? ❑ Has the team presented an idea that demonstrates stand out novel thinking?:

Table 2. Guide for judging criteria for F'AI'R Education Hackathon in Paris on February 26th 2020

Expected contribution of our work

We will seek to share preliminary findings from this series of incremental hackathons with the CHI community at this workshop to include the breadth and translation of ideas to solutions generated through the hackathons, panellist experiences of using the judging matrix and lessons learnt from student experiences and the interdisciplinary partnership.

References

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