BRIEF REPORT

To other new educational ways for interdisciplinary cooperation and innovation: about a student-driven hackathon [version 1; peer review: awaiting peer review]

Shams Ribault1-3, Hugo Bessaguet4,5, Hugo Ardaillon1,6, Guillaume Rousson7, Damien Nivesse1,3, Tasnim Fareh2, Anne-Sophie Malishchuk8, Alicia Milot9, Baptiste Eklu1-3, Perrine Seguin10, Gilles Rode1-3

1Service de Médecine Physique et de Réadaptation, Hôpital Henry Gabrielle, Hospices Civils de Lyon, Lyon, France
2Faculté de Médecine Lyon Est, Université Claude Bernard Lyon 1, Université de Lyon, Lyon, France
3Centre de Recherche en Neurosciences de Lyon (CRNL), Trajectoires Team, Inserm UMR-S 1028, CNRS UMR 5292, Université Claude Bernard Lyon 1, Université de Lyon, Lyon, France
4Service de Médecine Physique et de Réadaptation, Hôpital Bellevue, Centre Hospitalo-Universitaire de Saint Etienne, Saint-Etienne, France
5Laboratoire Interuniversitaire de Biologie de la Motricité (LIBM), EA 7424, Université Jean Monnet, Saint-Etienne, France
6Hôpital Neurologique, Service de rééducation neurologique, Hospices Civils de Lyon, 59 Boulevard Pinel, Bron, 69500, France
7Département d’Etudes Politiques et Territoriales de Saint-Etienne, Université Jean Monnet, Saint-Etienne, France
8Service de médecine physique et réadaptation, Centre Hospitalo-Universitaire de Rouen, Rouen, France
9Service de médecine physique et réadaptation, Hopital Sud, Centre Hospitalo-Universitaire de Grenoble, Grenoble, France
10Dycog, Inserm U1028; CNRS, UMR5292; Centre de Recherche en Neurosciences de Lyon, Université Claude Bernard Lyon 1, Université de Lyon, Lyon, France

Abstract

Background: Innovation in healthcare cannot be conceived without an interdisciplinary approach. Hackathons are an innovative approach to promote team working and demonstrated an interest in higher education through inquiry-based learning. An interdisciplinary team of students and young professionals organized the first hybrid presential and online neurorehabilitation hackathon, within the joined 2020 WCNR-SOFMER congress, adapting to the COVID-19 pandemic.

Methods: Interdisciplinary teams worked during two days on concrete issues met by people with a disability and their caregivers, accompanied by multi-skilled mentors to create tangible solutions. An independent jury selected the winning project.

Results: HRL met the expectations of 96% of the 31 participants. They reported better knowledge and ability about teamwork, ethics, and patient-centered approaches.

Conclusions: HRL allowed the creation of a strong interdisciplinary and international network which will be valuable to foster innovation.
It demonstrated its value in the junior and students' training for teamwork, communication, creativity in innovation, and ethics in health.

**Keywords**
- inquiry-based learning; interprofessional education; interdisciplinarity; medical education; hackathon; innovation

**Corresponding author:** Shams Ribault (shams.ribault@chu-lyon.fr)

**Author roles:**
- **Ribault S:** Conceptualization, Funding Acquisition, Investigation, Methodology, Project Administration, Supervision, Validation, Writing – Original Draft Preparation, Writing – Review & Editing;
- **Bessaguet H:** Conceptualization, Formal Analysis, Methodology, Project Administration, Supervision, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing;
- **Ardaillon H:** Investigation, Writing – Original Draft Preparation, Writing – Review & Editing;
- **Rousson G:** Investigation, Writing – Review & Editing;
- **Nivesse D:** Investigation, Writing – Review & Editing;
- **Fareh T:** Investigation, Writing – Review & Editing;
- **Malishchuk AS:** Investigation, Writing, Writing – Review & Editing;
- **Milot A:** Investigation, Writing – Review & Editing;
- **Eklu B:** Methodology, Writing – Review & Editing;
- **Seguin P:** Investigation, Supervision, Writing – Review & Editing;
- **Rode G:** Conceptualization, Funding Acquisition, Project Administration, Supervision, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

**Grant information:** This work was supported by Institut fédératif de recherche sur le handicap, Association des jeunes en médecine physique et de réadaptation and Faculté de Médecine Lyon Est.

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

**Copyright:** © 2022 Ribault S et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**How to cite this article:** Ribault S, Bessaguet H, Ardaillon H et al. *To other new educational ways for interdisciplinary cooperation and innovation: about a student-driven hackathon* [version 1; peer review: awaiting peer review] MedEdPublish 2022, **12**:20

https://doi.org/10.12688/mep.18991.1

**First published:** 17 Mar 2022, **12**:20 https://doi.org/10.12688/mep.18991.1
Introduction
Learning about interdisciplinarity is an essential feature of teaching and research that prepares medical students for future practice considerations. As innovation in health care cannot be conceived without this approach, teaching strategies must be adapted accordingly. This is particularly true in neuro-rehabilitation, a specialty in which young practitioners are confronted with interdisciplinarity on a daily basis, but for which teaching through innovation remains a rarely used modality. During the coronavirus disease (COVID-19) pandemic, social distancing prompted new educational ways for collaborative innovation.

Hackathons are innovation contests (Ramatowski et al., 2017) challenging interdisciplinary teams (Wang et al., 2018) to find solutions to problems in a defined short time (usually 48 hours). They have been organized in diverse domains such as rehabilitation (Silver et al., 2016), public health (Firenze et al., 2017), or rare diseases (Ferreira et al., 2019). Hackathons have led to the development of many projects (DePasse et al., 2014; Olson et al., 2017) and demonstrated an interest in higher education through inquiry-based learning (Kienzler & Fontanesi, 2017).

For the first time, a neuro-rehabilitation hackathon, the Hacking Rehab Lyon (HRL), was appended to the World Congress for Neuro-Rehabilitation (WCNR) and the Congress of the French society of physical and rehabilitation medicine (SOFMER), organized by the association of juniors in physical and rehabilitation medicine (AJMER), medical students from the interdisciplinary team (LE LAB) in the Faculté de Médecine Lyon Est (FoMLE), rehabilitation therapists and students, and the I-care LAB (a regional organization promoting health innovation). Facing the COVID-19 pandemic, the WCNR-SOFMER congress took place online, and the HRL steering committee organized a hybrid in-person/online hackathon, allowing students and professionals across French-speaking countries to join the event.

Material and methods
Three topics were selected for the HRL: “inclusion beyond accessibility”, “new technologies supporting disability”, and “childhood and parenting”. Partnerships ensured efficient communication among diverse professionals and students. In the months before HRL, four webinars (pre-hackathon webinars) were proposed. Communication was achieved through a dedicated website and social networks. HRL took place in the FoMLE from October 5 to October 7, 2020. During the launch event (October 5, evening), challenge-bearers pitched their ideas for five minutes to convince participants to join them. Five online, in person and mixed teams were formed, joined the Discord™, and worked on their projects, advised by mentors. At the end, teams presented their projects to a jury composed of three physicians in physical rehabilitation medicine, a physics researcher, the Lyon city delegate for inclusion, the president of a patient association (France Asso Santé), and the leader of Cluster I-Care. A 5000 € prize was allocated to the development of the winning project. Participants answered two live surveys (during the opening and closing ceremonies) using Wooclap™.

Ethics and consent
No identifiable data was harvested for our study. The data is completely anonymous, with no consequence on the scientific meaning of the study.

The study protocol is in accordance with the Declaration of Helsinki. Due to the design of the study (a satisfactory survey without any intervention on human subjects) the approval of an Ethical committee was not required, following the Art. R1121-1 of the Code de la Santé Publique.

The information towards the survey and the study was given orally during the Hackathon. Participants were given the possibility to participate in the study by connecting voluntarily to the Wooclap link. The filling of the questionnaire was not mandatory to participate in the Hackathon.

Results
In total 31 participants attended the hackathon; there were eight (26%) women, 17 (55%) were 25 years-old or younger (Ribault & Bessaguet, 2022). The most represented field of expertise was ‘engineering’, mainly in robotics and mechanics (16, 52% participants), followed by ‘medicine and paramedicine’ (10, 32%), and ‘culture, graphic design, clinical research, health product design, and insurance law’ (5, 16%). Overall, 18 (58%) participants worked on their hackathon project in the premises of the FoMLE, and 13 (42%) remotely.

Three projects focused on technological devices (a hearing solution providing spatial location for visually impaired patients, a sensor detecting fluid leaks from hospitalized patients, and a device for at-home memory and attention assessment of early-stage dementia). One project dealt with the elaboration of inclusive exhibitions in cultural facilities. The winning team developed a universal technical aid to adapt stroller on any kind of wheelchair.

The three highest-rated expectations of participants from the HRL were to mobilize their skills on a project (79%), to meet participants from other disciplines (62%), and to gain experience in project management (50%). HRL met the expectations of 30 (96%) participants, and the overall satisfaction rate was 83%. A better perception of disability in general and the need to address the importance of issues regarding health ethics and patient-centered design were reported. The radar chart (Figure 1) illustrates the achievements of pedagogical objectives pre-determined by the organizing team.

Discussion
HRL led to the design of five advanced innovative projects, among which one was awarded funding. Participants, mainly students and juniors from diverse disciplines, attributed a high rate of satisfaction and their expectations were met. They reported better knowledge and abilities regarding teamwork, ethics, and patient-centered approaches. Their awareness of issues faced by people with disabilities was increased. The hybrid format, adapted to the constraints of the COVID-19 pandemic, allowed
Hackathons are usually the place for interesting and innovative projects to be designed, however such projects are rarely developed and often remain as ideas. We decided to involve the I-care Lab, a healthcare innovation promoter, to support and ensure a follow-up on the winning project (Olson et al., 2017). One team lacked diversity of competencies, which was balanced by the presence of mentors.

Finally, this first student-driven neuro-rehabilitation hackathon has created a strong interdisciplinary and international network that will be valuable to foster innovation.

**Conclusion**

HRL is the first student-driven hackathon held during an international congress. Despite the COVID-19 pandemic, this hybrid edition was successful, creating a good dynamic within and between five teams. HRL demonstrated its value in student training for interdisciplinary cooperation and understanding of the issues faced by people with disability and neuro-rehabilitation innovation.

**Bullet points**

1. Hackathons demonstrated an interest in higher education through inquiry-based learning.
2. HRL created a strong interdisciplinary network that will be valuable to foster innovation.
3. The hybrid format allowed an international remote participation, and most likely enriched skill diversity.
4. HRL demonstrated its value in student training for interdisciplinary cooperation and understanding the issues faced by people with disability.

**Data availability**

B2Share: To other new educational ways for interdisciplinary cooperation and innovation: about a student-driven hackathon. http://doi.org/10.23728/b2share.a6be91df2461588935b48608a594e (Ribault & Bessaguet, 2022)

This project contains the following underlying data:
- Post-HRL questionnaire-results.csv
- Pre-HRL questionnaire-results.csv

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

**Acknowledgments**

The AJMER, IFRH, and the Faculté de Médecine Lyon Est funded HRL. The authors would like to thank all the participants, mentors, and jury members of HRL, as well as Mr. François Blanchardon, Mr. Gerald Comtet, Mrs. Juliette Tardy, Pr. Isabelle Laffont, and the SOFMER who helped us at each step of the HRL organization, and the WCNR co-chairs.

We also thank Hélène Boyer (DRS, Hospices Civils de Lyon) for her help in manuscript preparation.
DePasse JW, Carroll R, Ippolito A, et al.: Less noise, more hacking: how to deploy principles from MIT’s hacking medicine to accelerate health care. Int J Technol Assess Health Care. 2014; 30(3): 260–4.
PubMed Abstract | Publisher Full Text

Ferreira GC, Oberstaller J, Fonseca R, et al.: Iron Hack - A symposium/hackathon focused on porphyrias, Friedreich's ataxia, and other rare iron-related diseases [version 1; peer review: 2 approved]. F1000Res. 2019; 8: 1135.
PubMed Abstract | Publisher Full Text | Free Full Text

Firenze A, Provenzano S, Santangelo OE, et al.: Hackathon Public Health. Clin Ter. 2017; 168(6): e421–7.
PubMed Abstract | Publisher Full Text

Kienzler H, Fontanesi C: Learning through inquiry: a Global Health Hackathon. Teaching in Higher Education. 2017; 22(2): 129–42.
Publisher Full Text

Olson KR, Walsh M, Garg P, et al.: Health hackathons: theatre or substance? A survey assessment of outcomes from healthcare-focused hackathons in three countries. BMJ Innov. 2017; 3(1): 37–44.
PubMed Abstract | Publisher Full Text | Free Full Text

Ramatowski JW, Lee CX, Mantzavino A, et al.: Planning an innovation marathon at an infectious disease conference with results from the International Meeting on Emerging Diseases and Surveillance 2016 Hackathon. Int J Infect Dis. 2017; 65: 93–7.
PUBMed Abstract | Publisher Full Text | Free Full Text

Ribault S, Bessaguet H: To other new educational ways for interdisciplinary cooperation and innovation: about a student-driven hackathon [Data set]. 2022.
http://www.doi.org/10.23728/b2share.a7fda6be91df2461588935b48608a594e

Silver JK, Binder DS, Zubcevik N, et al.: Healthcare Hackathons Provide Educational and Innovation Opportunities: A Case Study and Best Practice Recommendations. J Med Syst. 2016; 40(7): 177.
PubMed Abstract | Publisher Full Text | Free Full Text

Wang JK, Pannani RD, Capasso R, et al.: An Extended Hackathon Model for Collaborative Education in Medical Innovation. J Med Syst. 2018; 42(12): 239.
PubMed Abstract | Publisher Full Text

Page 5 of 5