AFRICA HEALTH RESEARCH AND INNOVATION PROJECT (AHRIP)
REPORT 2023

ACCRA TECHNICAL UNIVERSITY

DesignThinking
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RISA
Research and Innovation
Systems in Africa

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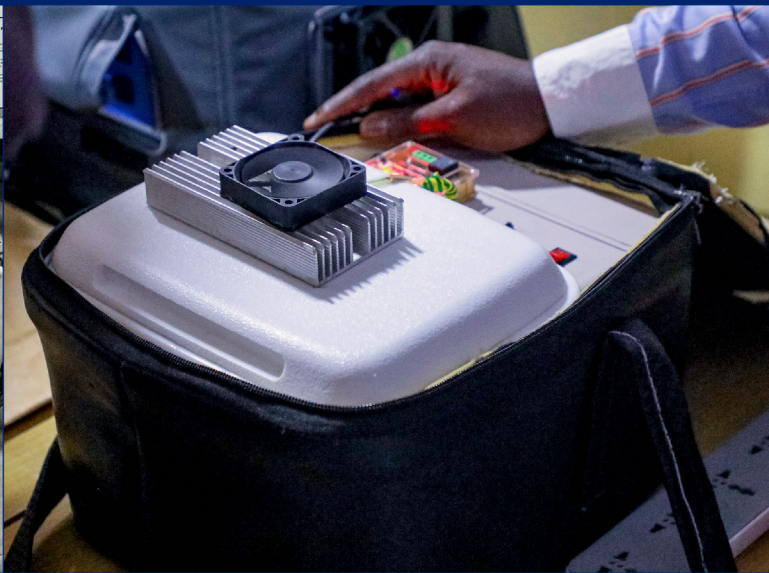
AFRICA HEALTH RESEARCH AND INNOVATION PROJECT (AHRIP)

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PROJECT
GOAL & OBJECTIVES

The ATU-RISA Project aimed to bridge the gap between research and development in the health sector while facilitating the development of commercially viable innovations for Ghana's health sector. The differentiator of this project is the adoption of the Design Thinking Methodology for innovation. The design thinking methodology enables innovators to develop user-centric solutions.

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FROM THE
PRINCIPAL INVESTIGATOR

We are thrilled to have been part of the Africa Health Research & Innovation Project, part of the Research and Innovation Systems for Africa (RISA) programme funded by the UK Foreign, Commonwealth & Development Office (FCDO). Accra Technical University, in partnership with Design Thinking Hub Ghana, is excited to embark on this academic journey and is now accepting applications to train young innovators.

The project aims to bridge the gap between research and development in the health sector by using Design Thinking analysis to solve real-world challenges and harness the talents of young emerging leaders in health innovations. Design thinking, a globally recognized process for achieving sustainable innovative results, encourages researchers to identify problems, create solutions, and implement new tools that can be used locally to improve healthcare and strengthen Africa's research and innovation systems.

Through comprehensive design thinking training and workshops, students will have the unique opportunity to advance their ideas and benefit from both technical and non-technical support and coaching to build their innovations. Accra Technical University is immensely excited about this initiative and looks forward to the impactful outcomes it will achieve.

Prof. Alice Constance Mensah
Dean Faculty of Applied SCiences-ATU/
principal Investigator, AHRIP

PROJECT **OFFICERS**

PROF. ALICE CONSTANCE MENSAH

Dean Faculty of Applied Sciences-ATU/Principal Investigator, AHRIP

PROF. GORDON ADOMDZA

Co-Principal Investigator, AHRIP

DR. ARCHIBALD DANQUAH AMOAH

Project Coordinator, AHRIP

EUGEN ELUERKEH

Capacity building specialist, AHRIP

ANITA BOAKYE YIADOM - COACH

Coach, AHRIP

SAMUEL AZUMAH

Finance Officer, AHRIP

MICHAEL TAGOE

Co-Facilitator, AHRIP

JOSHUA OKRAH-MENSAH

Communication Officer, AHRIP

MESSAGE FROM THE **FUNDERS**

The Research and Innovation Systems for Africa (RISA) Fund extends warm greetings and heartfelt solidarity to Accra Technical University (ATU) for your collaborative efforts on the Africa Health Research & Innovation Project.

The RISA Fund, running from 2021 to 2025 and funded by UK International Development, supports research and innovation systems in Ghana, Kenya, Nigeria, Rwanda, South Africa, and Ethiopia. Our mission is to foster inclusive economic growth and development through robust research and innovation ecosystems.

We are proud to support institutions like Accra Technical University that tackle Africa's complex social, economic, and health challenges. Through competitive RISA grants, we empower research institutes, think tanks, universities, private sector organisations, and NGOs to build sustainable partnerships, access vital knowledge, and connect with partners, investors, and markets. This support generates actionable research that drives technology, develops new products, and fosters business growth.

ATU's dedication to the Africa Health Research & Innovation Project exemplifies the transformative impact we aim to achieve. By leveraging Design Thinking to bridge the gap between research and development in the health sector, ATU nurtures young innovators and emerging leaders. Your comprehensive training and support turn groundbreaking ideas into practical solutions that significantly improve healthcare in Africa.

RISA stands in solidarity with ATU as you continue to lead this vital endeavour. Together, we are shaping a brighter, healthier, and more prosperous future for Africa.

Mr Gameli Adzaho
RISA Country Technical Lead, Ghana

FROM THE
HOST UNIVERSITY

Accra Technical University (ATU) is Excited about our collaboration with the Design Thinking Hub Ghana on the Africa Health Research & Innovation Project., a programme funded by the UK Foreign, Commonwealth & Development Office (FCDO) throught the RISA fund.

By tackling real-world challenges, this project aims to unleash the potential of young, emerging leaders in health innovation. Design Thinking, a globally acclaimed approach, promotes sustainable and innovative results by guiding researchers to identify problems, devise solutions, and implement practical tools that enhance local healthcare systems.

For our students, this project offers a unique opportunity to advance your ideas through comprehensive design thinking training and workshops. You will receive both technical and non-technical support and coaching to build up your innovations. This initiative will not only benefit student innovators by enhancing their skills and providing them with invaluable experience, but it will also elevate ATU's standing as a leading institution in health research and innovation.

On a broader scale, the Africa Health Research & Innovation Project will significantly contribute to strengthening Africa's research and innovation systems, driving progress in healthcare across the continent. We are proud to be at the forefront of this vital endeavour and look forward to seeing the transformative impact our students will make.

Prof. Amevi Acakpovi
Ag. Vice-Chancellor-ATU

INTRODUCTION/ **BACKGROUND**

Research and Innovation Systems for Africa (RISA) is a program funded by the UK Foreign, Commonwealth, and Development Office (FCDO) that aims to strengthen African research and innovation ecosystems. The ATU-RISA Project was delivered in a series of in-person bootcamps, online workshops and field research tasks. Each bootcamp was designed to help students take leadership of the challenge their respective teams chose to work on and drive the innovation process through a "learning by doing approach." Guided by a specifically designed Design Thinking Curriculum, the students were introduced to design thinking concepts and supported to apply them to their projects. The problem space and solution space formed the basis of the bootcamp structure and presented distinct tasks to be accomplished.

THE DESIGN THINKING
METHODOLOGY

Design thinking is a human-centred problem-solving approach that puts people at the heart of the design process. It encourages empathy and a deep understanding of user needs, motivations, and behaviours. By focusing on the user, design thinkers aim to uncover insights that lead to creating truly desirable and viable solutions.

The project is designed around the double-diamond model of design thinking. This model consists of two diamond-shaped stages: the problem space and the solution space. The problem space involves understanding and researching the problem through building empathy with the identified stakeholders or users to define the problem correctly. The solution space generates ideas and develops solutions based on the redefined problem.

Bootcamp 1 and post-bootcamp activities revolved around the problem space and included specific activities such as problem identification and refining, stakeholder mapping, research protocol mapping, and field research. In Bootcamp 2, the students engaged in ideation, prototyping, and testing.

The figure below provides a graphical presentation of the organisation of the flow of work by the students.
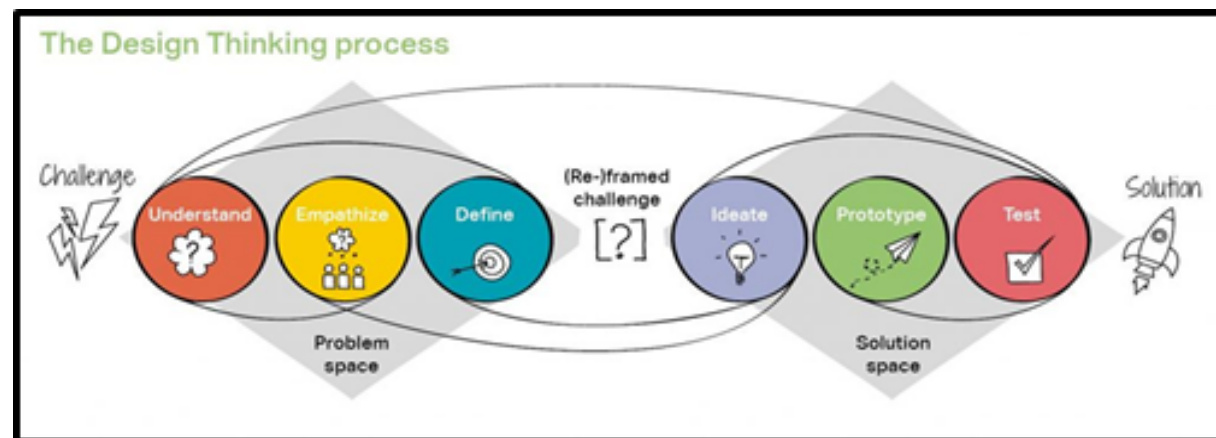

Figure 1: The Double Diamond Design Thinking Model .

PROJECT **ACTIVITIES**

BOOTCAMP 1

BOOTCAMP 1 SESSION

Bootcamp 1 was delivered in 3 days over three weeks at the Accra Technical University Campus, and each day hosted an average of 50 students organised in groups of 5. The 3rd session had fewer than the required student numbers, necessitating a mop-up session to meet the required number of participants. Each daily session ran for an average of 5 & ½ hours, with the maximum duration being 6 hours, and had the complement facilitators from ATU and DTGH participating to ensure that knowledge sharing and capacity building were achieved.

Curriculum content was developed by the DTGH Team, led by the Co-Principal Investigator and the Capacity Building Specialist. The Co-PI opened each session during Bootcamp 1, and content delivery was led by the Capacity Building Specialist using a "learn and do" approach with several engaging activities. The teams worked through 10 modules of the curriculum centred around the following:

Module 1: Introduction to Design Thinking in Health Care

Module 2: Deep Dive Into The Double Diamond

Module 3: Problems and Problem Space Mapping

Module 4: Conducting Your Ethnographic Research

Module 5: Sense-Making and Analysis

Module 6: Transitioning to the Solution Space: POV Statements and HMW Questions.

Module 7: Ideation

Module 8: Prototyping & Testing

Module 9: Finalising Your Prototype - Feedback, Analysis and Incorporation

Module 10: Beyond Your Prototype: MVP and Business Modelling

Specific deliverables required of participating teams were:

1. **Problem Identification, Selection, and Refinement:**
- Teams presented a shortlist of problems within a defined problem area.
- Each team meticulously selected and refined one specific problem for focused exploration.

2. Problem Space Mapping:
- Teams created a comprehensive document detailing the causes, effects, and stakeholders associated with the selected problem.
- The document served as a visual representation of the problem landscape.

3. Research Protocol:

- Teams developed a detailed research plan outlining their approach, methods, and objectives for the field research phase.
- This document guided teams through the execution of their field research activities.

ETHNOGRAPHIC RESEARCH

As part of the design thinking process, the teams conducted ethnographic research with guidance from their assigned coaches. This research focused on stakeholders identified in the research protocol during the problem space mapping stage. Ethnographic research, a qualitative approach rooted in anthropology, was crucial in revealing authentic stories and contextual insights from users. By immersing themselves in the environments of mapped-out stakeholders, teams built empathy, uncovered details and gained a better understanding of the complexities surrounding the identified problem.

Unlike the limitations of questionnaires or surveys, which can oversimplify user experiences, ethnographic research allows teams to collect in-depth, genuine data. Through direct interaction in natural settings using methods such as in-depth interviews, direct observation, and shadowing, teams organically observed behaviours, emotions, and challenges, capturing nuances often missed in structured surveys.

These methods added depth to the collected data, enriching the design thinking process and contributing to the creation of user-centred solutions.

BOOTCAMP 2

BOOTCAMP 2 SESSION

Bootcamp 2 was similarly delivered in 3 days to give the students sufficient time to test the prototypes with their users.

The Co-PI opened each session during Bootcamp 2, and content delivery was led by the Capacity Building Specialist using a "learn and do" approach with several engaging activities. The learn-and-do approach has proven very useful as it allows quick working and turnaround in delivery during the session.

Having explored the problem space through Bootcamp 1 and the field research, in Bootcamp 2, the students undertook a sensemaking and analysis session to define the problem correctly in the user's context, considering their needs and empathetic insights. With an appropriate definition of the problem, they were ready to explore the solution space.

In the solution space, the students developed ideas, built prototypes, and then went back to the field to test their prototypes with the users they interviewed.

During Bootcamp 2, the teams walked through the following topics:
- Recap of the field research experience - lessons learned and challenges experienced
- Sensemaking and Analysis of Research Findings
- Problem definition: Point of View Statement and How Might We questions
- Ideation
- Prototyping
- Testing and Prototype Testing Protocol.

Specific deliverables required of participating teams were:
- Persona Map,
- Empathy Map
- Point of View Statement, HMW Statements, and Top 3 Ideas
- Prototype
- Prototype Testing Protocol

1. Post-Research Notes and Quotes:
- Teams compiled a document containing key notes and impactful quotes from the field research.
- This collection provided insights into user experiences and perspectives.

2. Persona Map:
- Teams crafted a detailed Persona Map, providing a holistic representation of the most impacted stakeholder and their critical needs.

3. Empathy Map:
- Teams developed an Empathy Map to delve deeper into the emotional and experiential aspects of the user as influenced by thoughts, feelings, actions, sights and sounds to gain a comprehensive understanding.

4. Problem Definition: (Point of View Statement and How Might We Questions)
- Each team articulated a clear Point of View (POV) statement and formulated How Might We (HMW) questions to define the problem space precisely.

5. Prototypes:
- Teams produced physical prototypes that embodied their innovative solutions to the identified problem.
- These prototypes served as tangible representations of the proposed solutions.

6. Prototype Testing Protocol:
- Teams documented a robust testing strategy, including specific questions, to gather feedback from end users.
- This protocol guided teams through the iterative process of refining their prototypes.

These deliverables summarise the core principles of a user-centred problem-solving approach, ensuring solutions are tailored to the identified persona and address the most critical needs. Students dedicated two weeks to testing with users, supported by follow-up online sessions to further develop their prototypes.

Bootcamp 2 served as a crucial checkpoint, allowing the Capacity-Building Specialists to evaluate the quality of the student team's research, problem space exploration and user understanding. Secondly, the Prototype Testing protocol facilitated a deeper understanding of users through validation, feedback, and recommendations, aligning with the iterative nature of the design thinking process. The focus was to ensure that the student teams created Desirable, Viable and Feasible solutions, emphasising desirability and feasibility at this project stage.

IDEATION AND LOW-FIDELITY PROTOTYPING

Informed by insights from the analysis of data from their ethnographic research, the student teams came up with ideas to generate solutions for the identified problems. Translating these ideas into tangible forms, they developed prototypes utilising basic materials such as cardboard and paper to craft low-fidelity prototypes.

In August, the student groups dedicated themselves to refining and enhancing their prototypes through successive iterative cycles using a protocol guide developed by the DTGH. The testing phase of these prototypes received active support from Mentors and Coaches, complemented by online sessions led by the project's Capacity Building Specialist.

ONLINE SESSION ON PROTOTYPE AFTER TESTING

An additional online session was organised for the teams to address the steps after prototype testing, emphasising the subsequent steps in the iterative improvement process.

1. **Feedback Analysis and Iterative Refinement -** The student teams systematically analysed the feedback data collected using an after-testing protocol designed and provided by the Capacity Building Specialist. The insights generated dictated the iterative refinement of their prototypes.

2. **Quality Function Deployment (QFD) Process -** Employing the QFD process, teams systematically translated the user feedback and insights into practical

product requirements using a QFD protocol. This process was essential to help the teams understand the feasibility process and the key considerations product design and innovation teams make to convert prototypes into Minimum Viable Products.

After the online session, ten design thinking coaches continued to engage the 40 teams to reinforce student learning. This ensured that the innovation process continued successfully.

DESIGN THINKING BOOTCAMP FOR SHS STUDENTS

The one-day SHS Design Thinking Bootcamp brought together 70 senior high school students from five schools invited by ATU. The students were organised into nine groups, with an average of ten students per group. As part of the deliverables required of the Accra Technical University-Africa Health Research and Innovation Project, groups such as SHS students are to be introduced to the Design Thinking methodology and allowed to develop innovations with potential for further development and commercialisation.

After taking the students through the five stages of the Design Thinking process (Problem identification, Empathise, Problem Definition, Ideation, Prototyping, and testing), nine project teams were formed to ensure cross-learning and contributions from diverse perspectives. The teams were formed by mixing genders and students from different schools.

The bootcamp provided a structured framework for the students to understand and apply design thinking principles. Through a series of interactive sessions, they learned how to empathise with identified stakeholders, identify unmet needs, brainstorm ideas, and develop prototypes. The emphasis was on creating patient-centred solutions to address healthcare challenges.

By involving senior high school students, the bootcamp aimed to cultivate a culture of innovation and problem-solving from a young age, empowering the next generation to contribute to healthcare research and innovation. The bootcamp ended with exciting ideas and concepts from the participants.

Some of the key innovation challenge areas the student project teams worked on included:
- Access to ambulance services
- Difficulty in financing healthcare services by patients
- Unprofessionalism from healthcare workers such as nurses
- Administering wrong prescriptions to patients by nurses
- Poor healthcare provision for senior citizens (old patients)

Among the solution concepts and prototypes built were:
- A community-based fundraising system that allowed community folks to contribute towards the healthcare bills of those who are in dire need of financial support to cater for healthcare needs.

- A program to induce government and private support, among other key stakeholders, to get more ambulances into the healthcare system.

- A comprehensive healthcare system that provides nutritional, medicinal, physiological, and general healing treatment services for old patients with an average age of 60 years and above.

- A support program to better train nurses on empathetic and passionate health service delivery.
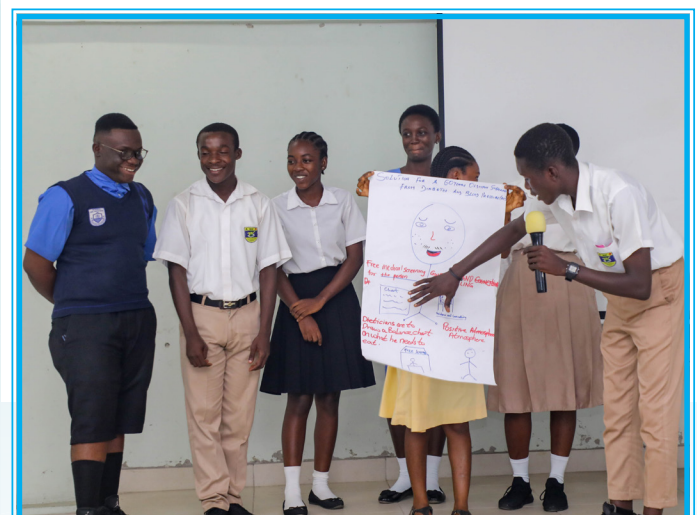
DESIGN THINKING BOOTCAMP FOR TERTIARY STUDENTS

A one-day design thinking bootcamp was organised for tertiary students to provide participants with a hands-on experiential learning opportunity through the design thinking process. The bootcamp encompassed various stages, starting from empathy and moving through definition, ideation, rapid prototyping, and concluding with a brief testing protocol. The facilitator introduced design thinking, emphasising its user-centred approach and iterative nature. The participants were given an overview of the various stages of the design thinking process: empathy, definition, ideation, rapid prototyping, and testing. Interactive activities and exercises were incorporated into each step to ensure that the participants grasped the fundamentals of design thinking. Through guided discussions and practical examples, participants were encouraged to develop a deep understanding of the end users' needs and challenges during the empathy phase. Subsequently, brainstorming sessions were facilitated during the definition and ideation stages, encouraging the participants to generate innovative and out-of-the-box ideas.

The bootcamp also featured hands-on rapid prototyping sessions, where participants were allowed to transform their ideas into tangible prototypes. They were given various materials and resources to unleash their creativity and bring their concepts to life. The atmosphere was energetic and collaborative, with participants actively sharing and refining their prototypes based on constructive feedback from their peers and facilitators. Toward the end of the session, a session on protocol testing allowed the teams to identify ways of evaluating the usability and effectiveness of their prototypes. Participants had the chance to observe and gather feedback from their fellow attendees, enabling them to gain insights into the strengths and weaknesses of their designs. The testing phase also fostered a culture of continuous improvement as participants iterated on their prototypes based on the feedback received. The session successfully achieved its objectives, providing participants with a comprehensive hands-on experience of the design thinking process, from empathy to testing.

VISIT TO POTENTIAL PARTNERS AND COLLABORATORS

As part of the project's collaborative efforts, the ATU team conducted working visits to institutions and healthcare facilities that student teams had engaged with during the ethnographic research phase. These visits aimed to discuss the solutions being developed by the teams, assess whether they align with the institutions' needs, and gauge their willingness to integrate these solutions into their operations. Feedback received from these institutions is highly encouraging, as many of the healthcare facilities expressed a genuine eagerness to embrace and incorporate the students' solutions. For example, the National Blood Service expressed excitement about the blood warmer solution, acknowledging its potential to enhance its operations significantly. They emphasised that it would be a valuable addition to their processes, particularly since they lack a blood warmer and have had to resort to makeshift methods to carry out their activities.

VALIDATION WORKSHOP & EXHIBITION PREPARATION SESSION

A two-hour online session was conducted on August 11, 2023, primarily focusing on preparing students for the upcoming innovation fair. The session highlighted vital areas that teams should concentrate on while preparing their products for the exhibition. This encompassed guiding groups through the processes required to advance their prototypes into Minimum Viable Products (MVPs) suitable for presentation at the fair. Additionally, students were provided with templates that could be utilised for their exhibition presentations.

In the lead-up to the exhibition, the teams collaborated closely with their coaches to assemble their exhibition presentations and develop their MVPs/Prototypes for display at the innovation fair.

## DESIGN THINKING BOOTCAMP FOR WEST AFRICAN PARTICIPANTS

A one-day virtual design thinking session was held for an international audience mainly drawn from partner Nigerian Universities on 30th November 2023. The Accra Technical University facilitated the invitation process with its partner universities in Nigeria. Thirty participants attended the online session. The session provided an overview of the design thinking process and the key concepts in the innovation process. Using the case study of the Embrace Baby Warmer case study developed by innovators from Stanford University, the participants were enlightened about the power of design thinking to create innovative solutions. The session ended with Questions and Answers. This session was a great success with the participants based on their feedback, interest and participation.

M&E CONSIDERATIONS FOR THE SESSION

From the pre- and post-training surveys, participants' expectations of the design thinking workshop of helping create a user experience that resonates with the users, expanding knowledge in creativity and innovative skills, and learning new concepts and techniques were met adequately. In addition, the number of participants who were very familiar with design thinking increased from 10% of the participants (pre-survey) to 25% in the post-survey. Furthermore, 75% of the participants rated their level of knowledge on design thinking above 4 (on a scale of 1 to 7) in the post-survey compared to 53.3% of participants in the pre-survey.

GESI INTEGRATION FOR THE SESSION

Integrating GESI into innovative production development is part of the design thinking process. The participants filled out a survey during the session; as shown in the figure below, 77% of the participants were male, and 23% were female, indicating that more males than females participated in the workshop.
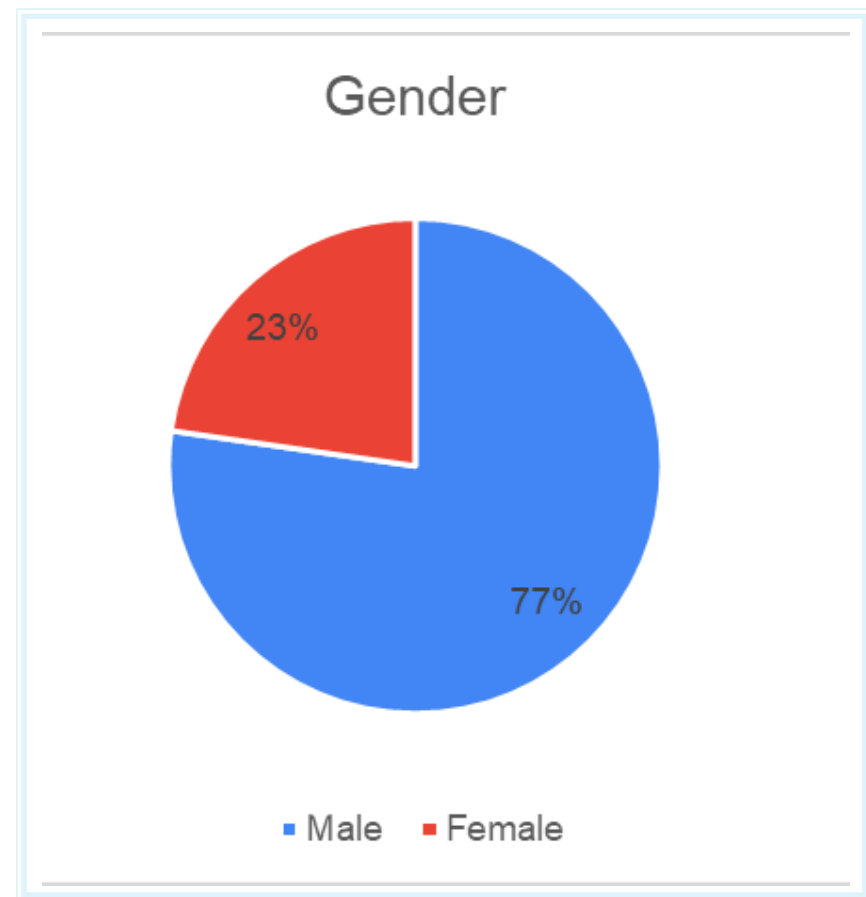
The age cohorts of the participants are presented in the figure below. Fifteen participants were between the age groups of 31-40, 21-30, and 41-50, which were 3, respectively, and the 51-60 age group was 1.
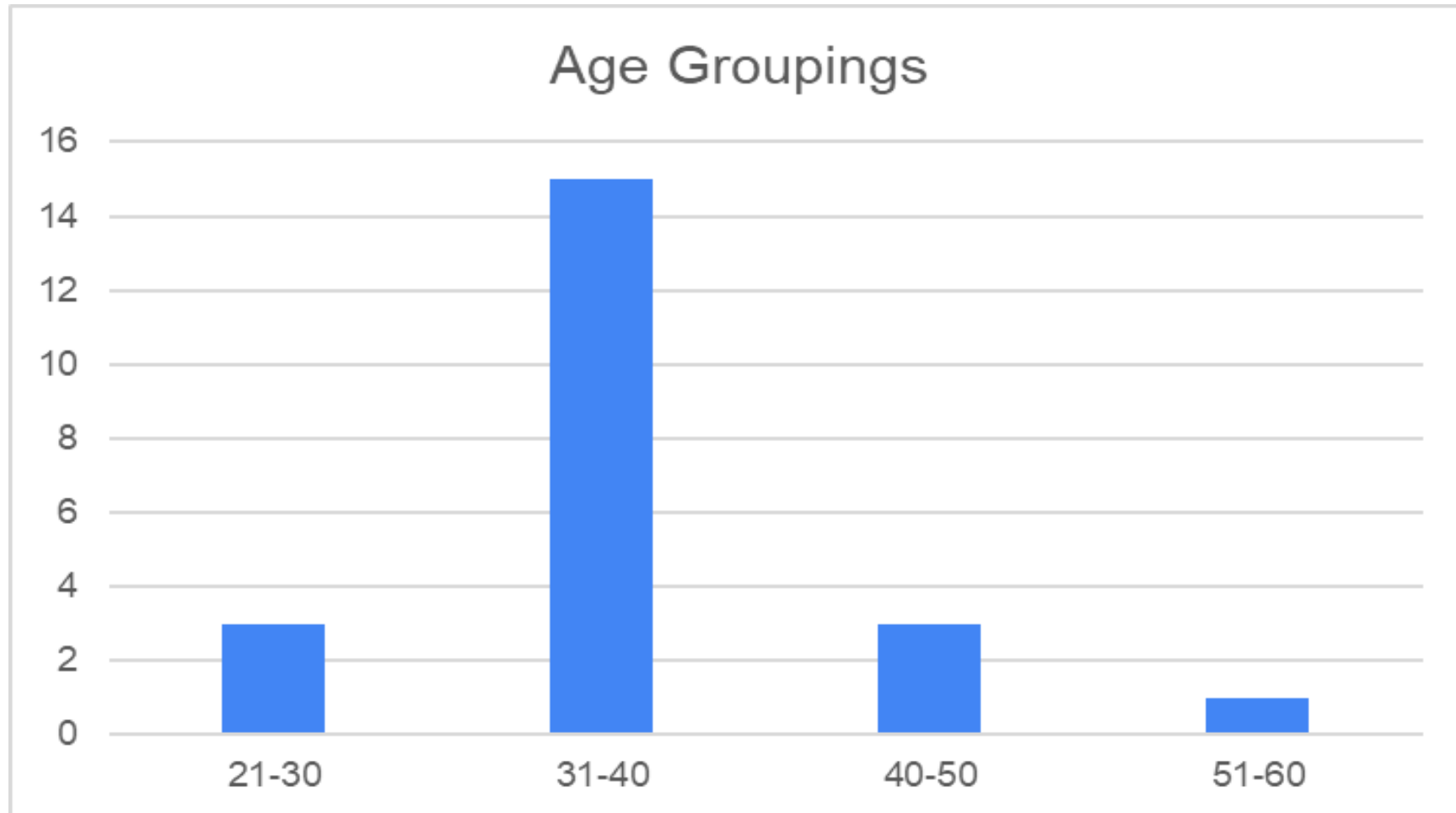
The figure below illustrates the level of education of the participants surveyed. Most (13) were level 400 students, four had graduated level 100 and 300 had two representatives each, while 200 were 1.
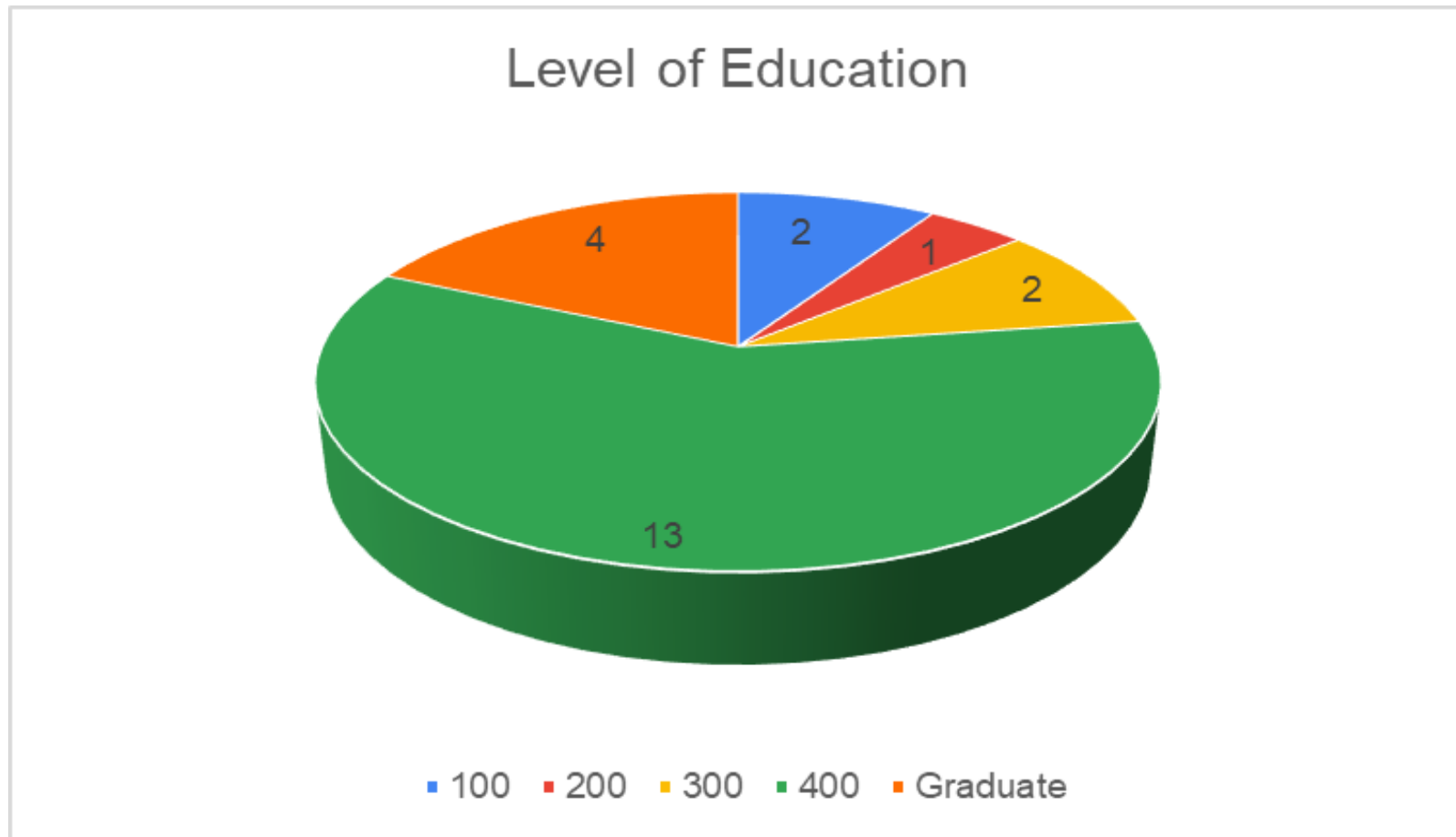
A survey on the programme of study indicated that those pursuing general science had 10, followed by business, technical/vocational skills, and computer science/statistics with 4, with the least being general arts and purchasing and supply with one each. This is illustrated in the figure below.
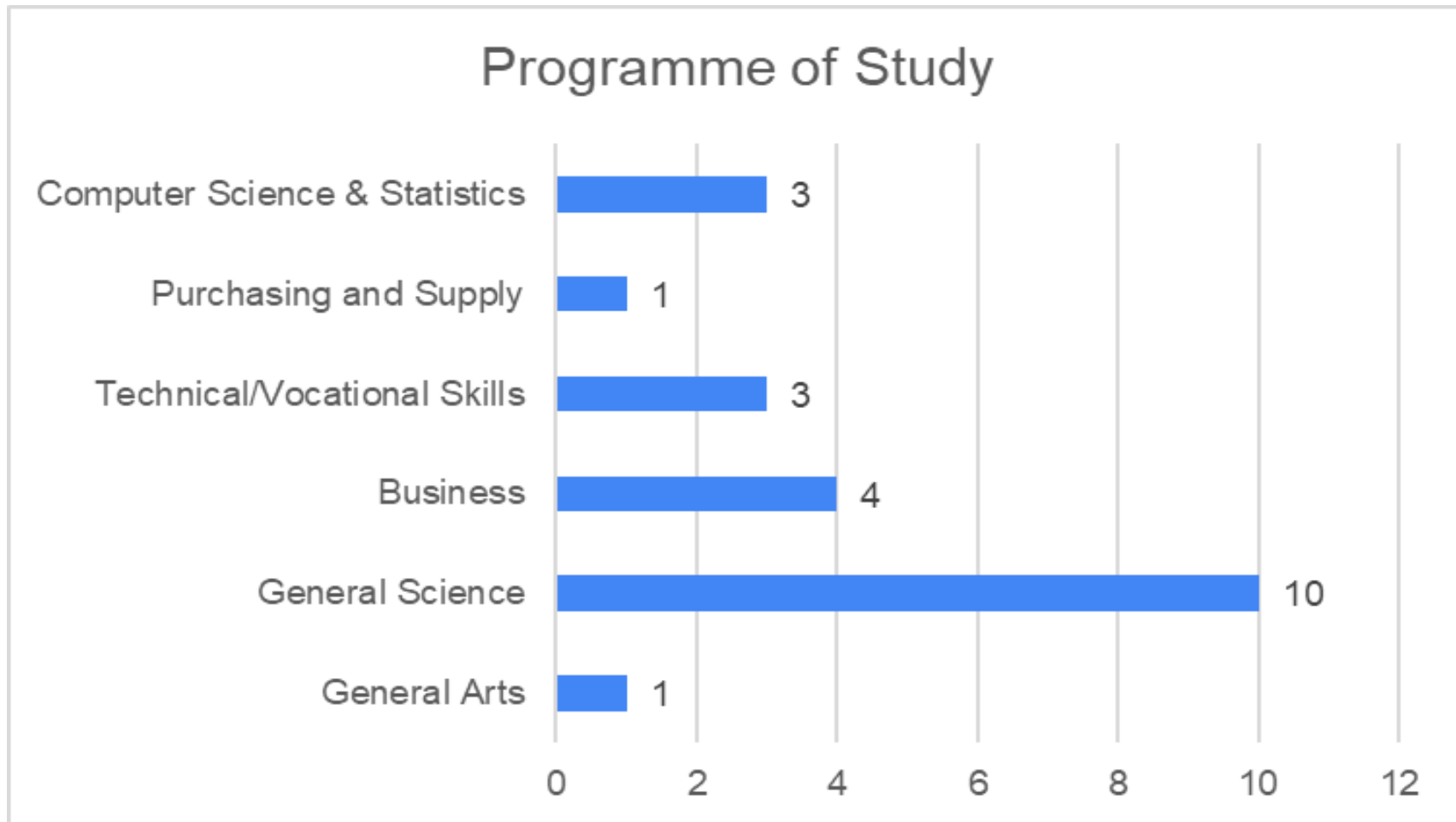
MONITORING AND EVALUATION (M&E) OF THE PROJECT

Monitoring and evaluation are crucial to ensuring the success of projects and programs. The continuous collection of data regarding the implementation of the project contributes to measuring the effectiveness and efficiency of the project activities.

To measure the project's outcome and impact, a pre-training and post-training survey and in-depth interviews were implemented for the Design thinking process. This is essential in determining the usefulness of the design thinking training, assessing the ease of using the training materials and determining improvement in participants' knowledge regarding design thinking. Further, routine data collection from students, coaches, and other project personnel was implemented to ensure that project progress was adequately captured for reporting. Based on the robust M&E system implemented for the project, project outputs and outcomes were captured and reported as follows:

PROJECT RESULTS AND OUTCOMES

OUTPUTS

Output 1: Existing health research findings identified, evaluated, and selected for prototyping

Indicator 1.1: Proportion of findings identified that are evaluated

Intended: This indicator intends to capture the number of identified research findings/prototypes submitted by faculty and students and evaluated and selected for inclusion in the project. The intention was to assess all (100%) findings/protocols submitted and received.

Actual: The ATU team identified 7 existing research findings/prototypes through active search, and all 7 (100%) research findings/prototypes were evaluated and selected to be part of the design thinking process.

Indicator 1.2: Number of new or existing findings selected for prototyping (P), and proportion of which are findings led by women (W)

Intended: This indicator intended to have 7 existing findings that would be prototyped through this project using the design thinking methodology and 8 new findings that will be prototyped. As part of our measures, this indicator also tracks the number of prototypes led by a woman and/or that involve a woman.

Actual: A total of 29 prototypes were exhibited by 28 student groups during the innovation fair. Out of the 28 groups, there were four (13.8%) groups led by a female, and females played key roles in many of the remaining groups.

Overview and comments on achievements under Output 1: As planned, existing and new innovations were identified and prototyped. At the end of the project period, 29 innovations were prototyped and exhibited, with 13.8% of these prototypes led by females.

PROJECT RESULTS AND OUTCOMES

OUTPUTS

Output 2: Capacity building and support in Design Thinking to develop health innovations and solutions provided to interested students

Indicator 2.1: Number of students trained in design Thinking methodology

Intended: The project intended to train a total of 100 students in the design thinking approach who will be guided by coaches to develop innovations using the design thinking process, and introduce design thinking concepts to 150 tertiary and SHS students through bootcamps.

Actual: A total of 175 students put into 41 teams were trained and guided to develop an innovation, and a total of 120 tertiary and SHS students participated in the design thinking bootcamps. In addition, design thinking methodology was introduced to 50 international participants through an online training session.

Indicator 2.2: Proportion of capacity building attendees perceiving capacity building and/or technical support to be useful

Intended: The project intended that at least 70% of the participants in design thinking training bootcamps find the training useful and would be able to apply in future projects, and in other areas to be able to come up with innovations. stories of change concerning the usefulness of the training and training materials are intended to be captured.

Actual: From the interviews and post-training survey with students, almost all students found the design thinking training useful, especially in their future endeavours, including their final year projects. An estimated 98% of capacity-building attendees/participants indicated that design thinking methodology training is a useful tool for innovation and creativity.

Indicator 2.3: Tangible examples of participants in capacity building engaging with the material with ease

Intended: This intends to capture stories of change from participants regarding applying the design thinking methodology in other projects and other areas of work. A total of 6 stories of change has been planned.

Actual: Interviewers and post-training surveys were conducted among selected students across the groups and cohorts. From this process, 5 stories of change have been captured to indicate how students have engaged and used the design thinking training and materials.

PROJECT RESULTS AND OUTCOMES

OUTPUTS
"For another program I participated in, we were given a problem on how some bankers find it difficult to track their spending. Based on the design thinking process I have learnt in this program, I developed an app using MS Word power app, and it helped my team, and I compete well and gain access to the next stage of that program." - Edward Anokye Gyasi, member of cohort 5 group 4. *"The design thinking process has really helped me in my final year project. I applied the design thinking ideas I learned during the sessions we had in my final year project, and it was very helpful. Whenever I present to my supervisor, he will ask, did you get help from somewhere? And I would say, 'no, I did it myself,'. And it was because of the knowledge I gained from the design thinking. It really helped me a lot."* – Haruna Suleman, member cohort 1 group 7 *"The Design thinking concepts really enlarged my thinking on my final year project. In fact, it has enabled me to realise new ways of tackling problems, in general"* - Emmanuel Oko Asamtey, member cohort 1 group 6 *"Design thinking has fostered my creativity and innovation. It has also encouraged me to think outside the box, which I was able to do to come up with an innovative idea of an app that can help manage diabetic patients"* - Adams Zarawu, a female member of cohort 5 group 4 *"For me, the most interesting aspect of design thinking was learning about the power of empathy. It was fascinating to understand how putting yourself in the shoes of the user can lead to more impactful and meaningful solutions than I ever imagined"* - Adama Samuel Teiko, member of cohort 5 group 7
Overview and comments on achievements under Output 2: Design thinking methodology has been a key learning for many of the student participants. These students have used and continue to use the approach in various fields of study to create solutions and innovations.

PROJECT RESULTS AND OUTCOMES

OUTPUTS
Output 3: Convening of businesses, researchers, and innovators **Indicator 3.1:** Tangible examples of relationships built between businesses and researchers and innovators **Intended:** building relationships with relevant stakeholders is key in an innovation project. Therefore, this indicator intends to capture relationships built through collaborations and partnerships with businesses, researchers, and other innovators. A total of 5 planned relationships will be with organisations, researchers, other innovators, and health institutions. **Actual:** The ATU has established working relationships with institutions such as the National Blood Service, the Biomedical Engineering unit of the Ministry of Health, Ghana Health Service, the Country Impact Platform, and other health institutions. There is also a working relationship with the Design Thinking Ghana Hub - the project's Technical experts, where future engagement for the training of students and faculty could be explored. In addition, collaboration has been established between ATU and other recipients of RISA funds, including Ispace, Heritors Lab, and the University of Ghana. This collaboration is leading up to an African conference on innovation in 2024.
Overview and comments on achievements under Output 3: The bringing on board of national institutions and agencies during the exhibition of the innovation to appreciate the innovations created by students was key in mainstreaming local innovations in our health system. However, collaborations and partnerships with businesses and investors were inadequate and could be explored more, as the innovations will require capital for further development and commercialisation.

OUTCOMES

Outcome: The production of high-quality research is increased and disseminated more widely across the R&I ecosystem

- Increase in the uptake and utilisation of research and evidence

- R&I ecosystem facilitates and enables innovations and research to commercialise and scale through inclusive pathways

Target Indicator 1.1	Results:
Stories of Change showing Design Thinking trainees demonstrating the use of new skills to develop quality research or innovations	*"I worked on a Dino based sine wave inverter with power factor and voltage regulation. So, power factor and voltage are some of the parameters within the electrical fraternity. These things have the possibility or the chance of scaling down the efficiency of an inverter when it converts DC power to AC power. So, my project was building an inverter that converted DC power to AC power while taking care of these parameters that affect the inverter's efficiency. In working on this project, I employed the empathy principle in design thinking, where I engaged industries that used inverters and then asked some specific questions. I asked them questions about how they think the inverter will be improved. Through this engagement, I got the idea of power factor and voltage regulation and the incorporation of load sensors that will automatically adjust the power factor and then the voltage to meet the load standard. My original idea was to design it to be manually regulated. Without the knowledge gained from design thinking I will have designed a Dino-based sine wave inverter that will not suit users need" – Emmanuel W. Bisiiki, member of Cohort 1 group 7*

OUTCOMES

Outcome: The production of high-quality research is increased and disseminated more widely across the R&I ecosystem
- Increase in the uptake and utilisation of research and evidence
- R&I ecosystem facilitates and enables innovations and research to commercialise and scale through inclusive pathways

Target Indicator 1.2	Results:
Tangible examples of increased cooperation* between stakeholders, bridging research and innovation (showing what synergy can look like) (cumulative)	As part of our collaborative efforts, the ATU team conducted working visits to institutions and healthcare facilities that students and teams had engaged with during the ethnographic research phase. These institutions were genuinely eager to embrace and incorporate the students' solutions. For example, the National Blood Service expressed excitement about the blood warmer solution, acknowledging its potential to enhance its operations significantly. They emphasised that it would be a valuable addition to their processes, particularly since they lack a blood warmer and have had to resort to makeshift methods to carry out their activities. As such, during the innovation exhibition fair. Officials of the National Blood Services were present to observe the status of the blood warmer project.

Partnership and collaboration with other RISA fund recipients, including Heritors Lab, iSpace, and the University of Ghana, has led to the holding of an African Research and Innovation conference in 2024. |

OUTCOMES

Outcome: The production of high-quality research is increased and disseminated more widely across the R&I ecosystem

- Increase in the uptake and utilisation of research and evidence

- R&I ecosystem facilitates and enables innovations and research to commercialise and scale through inclusive pathways

Target Indicator 1.3	Results:
Tangible examples of steps taken in prototypes being developed with the support of Accra Technical University (P), and proportion of which have been led by women (W) (cumulative)	The project initiated 44 concepts, out of which 33 of the concepts elaborated into prototypes completing the first of the three stages. Of the 33 that completed the first stage, 29 tested their prototypes with stakeholders and incorporated stakeholder feedback to improve prototypes, completing stage two of the three stages. Female-led groups that completed the second stage were 17.9% During the exhibition of the stage two prototypes, 12 of the prototypes were selected as potential prototypes that can be supported and guided to produce a proof of concept for IP registration. Among the selected prototypes for stage 3, 25%(3) were led by a female.

Comments on achievements under Outcome: The project's planned outcome has been achieved. However, there is a need for continuous efforts to maintain and strengthen established partnerships and collaborations. In addition, partnerships and collaborations need to be extended to businesses and investors to bring about innovation commercialisation. The African Research and Innovation conference could be an excellent opportunity to bring on board businesses and investors for further development and commercialisation of innovations.

GENDER EQUALITY AND **SOCIAL INCLUSION(GESI) OF THE PROJECT**

The purpose of Gender Equality and Social Inclusion (GESI) is to mainstream social inclusion and allow for full equality and inclusion of women and the vulnerable throughout the process of innovative thinking and project development. The project incorporated GESI from the recruitment of candidates, introduction to design thinking and exploration of problem space, including research phases to the development of the final product.

Through the design thinking activities, the GESI components used a blend of qualitative and quantitative methods, including a desk review of project background and presentation, surveys, online engagement, data processing and reporting.

There were training sections on Gender Equality and Social Inclusion (GESI) for participants during the various bootcamps. The training was in the form of PowerPoint presentations on mainstreaming GESI through Design Thinking and the project implementation process.
The outline of the presentation included the following:
* Introduction
* Objectives of GESI
* Definition of the Terminology
* Laws and Policies on GESI
* The processes of GESI on the project
* Indicators to be tracked as part of the implementation of GESI on the project.

At the end of each session, an online survey was conducted to assess the level of diversity and inclusion of the various Cohorts. The coaches were also trained in GESI and how to ensure it is mainstreamed into product development and to guide the students during the field research. A field GESI guide was shared with the coaches to assist them in navigating the students during the field research. During the field research, the coaches guided the students to be conscious of GESI in identifying and interviewing subjects for their product.

The exhibition presented prototypes of innovative products designed by students as part of the design thinking training activities. Several innovative products were developed by the students who had been trained in the course of the Design Thinking process. Most of the products exhibited had GESI considerations, as evident in the final prototypes.
Examples of some of the innovative products include:

- **Lump Detector Device** - a portable lump detector device to assist particularly women who do not have access to a mammography machine to screen and detect lumps which could cause cancer.

- **Digi Doc** - This is a mobile phone application that assists women in accessing health care for the treatment of postpartum psychosis, a condition that affects women after childbirth. The app will have built-in music options to help calm the patient down.

- **Wireless Medical Button Sensor** - This wearable device is designed for children with heart conditions. It provides real-time monitoring for those with heart conditions to access health care easily, particularly in emergencies.

At the boot camp for the West African participants, there was a presentation on design thinking, which included a case study.

The case study for the bootcamp was GESI-related, and it was about an incubator for babies born prematurely in an Indian health facility and how the mothers were not using the incubators even though their newborn babies were dying.

Investigation revealed that the mothers were not using the incubators for cultural reasons. Through a design thinking approach with GESI considerations, a new device that could be used was developed, and this reduced infant mortality drastically.

IMPACT **STORIES**

High interest from some stakeholders (e.g. Sweden Ghana Medical Centre) contrary to the envisaged low interest. In the past month, the team has received calls from some stakeholders engaged during the student ethnographic research requesting feedback on student innovations. The project team made subsequent visits to stakeholders they engaged during the ethnographic research to understand if the projects meet their needs and understand their willingness to accept such projects into their operational processes. Stakeholders showed a higher level of need for such solutions and their readiness to use them when they are ready. The team understood that some stakeholders were improvising in their operational activities to get their work done. For example, the National Blood Service expressed excitement about the blood warmer solution, acknowledging its potential to enhance

its operations significantly. They emphasised that it would be a valuable addition to their processes, particularly since they currently lack a blood warmer and have had to resort to makeshift methods to warm blood during blood transfusion.

This is a good indication that some stakeholders are ready to adopt and use these innovations to help deliver their work efficiently.

The result of this project is a proposal to run Design thinking as an elective course at ATU. During the exhibition fair, the PI of the RISA project, who doubles as the Dean of the Faculty of Applied Science, indicated in her speech that discussions are far advanced to include design thinking in ATU's curriculum. The proposal is to run it as a free elective course for interested students and faculty. To corroborate this statement, the Acting Vice Chancellor of ATU also indicated that the university is establishing an innovation hub and that the design thinking methodology will be a key component of the services that the innovation hub will provide for students and faculty.

KEY **ACHIEVEMENTS**

1

The successful impartation of knowledge to students, faculty, and coaches.

2

Increased student engagement and enthusiasm in the learning process.

3

Enhanced problem-solving and critical thinking skills among participants

4

Of the **41 groups, 28 fully** completed the design thinking process and exhibited **29** prototypes during the innovation fair.

5

Noteworthy innovations like the automated water pumper, the diabetic monitor, a blood warmer, the voice-controlled automatic stretcher for patient transportation, vaccine carriers, a portable dialysis machine, and a lump detection device emerged.

LESSONS LEARNED AND
CHALLENGES FACED

LESSONS

1. High interest of some stakeholders is shown in student innovations and the eagerness of these stakeholders to get feedback on the students' innovations.

2. During the site visit to stakeholders, it was realised there is a need for some of the students' innovations, and stakeholders are willing to use such solutions in their operations. Due to the absence of some of these solutions, some stakeholders improvise in undertaking technical and operational activities.

CHALLENGES

1. Low interest in people presenting their research findings for prototyping through the design thinking process. This led to very low patronage of the call for application for existing research findings and/or projects.

2. Students' availability: One critical challenge was the availability of students for the continuation of the project during examination and vacation periods. As such, engaging students for the project was impossible as the majority would not be available. To overcome this challenge, the project team led by the project PI

decided to credit work hours on the project as part of the mandatory internship at the university. In addition, adopting online sessions helped sustain students' interest. This ensured students became committed to their project and reported back to campus to spend some time on it at the AI lab.

3. Administrative processes in institutions and health facilities that students needed to engage for information and data posed a challenge initially and delayed some of the student groups during the ethnographic research process.

4. Administrative hurdles delayed closing out an agreement with potential partners to submit a funding proposal. The team could not meet the submission deadline.

CONCLUSION

Throughout the implementation of the project, ATU together with DTGH, through the facilitators and coaches, provided continuous support to students and groups each step of the way. This ensured the sustained interest of students in the innovation process, leading to the exhibition of 29 prototypes by students. The design thinking process' emphasis on involving stakeholders or potential users in designing solutions led to the expression of interest by some stakeholders in the students' innovations.
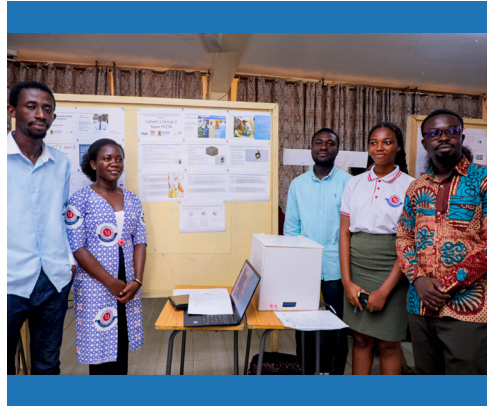
AHRIP IN PICTURES

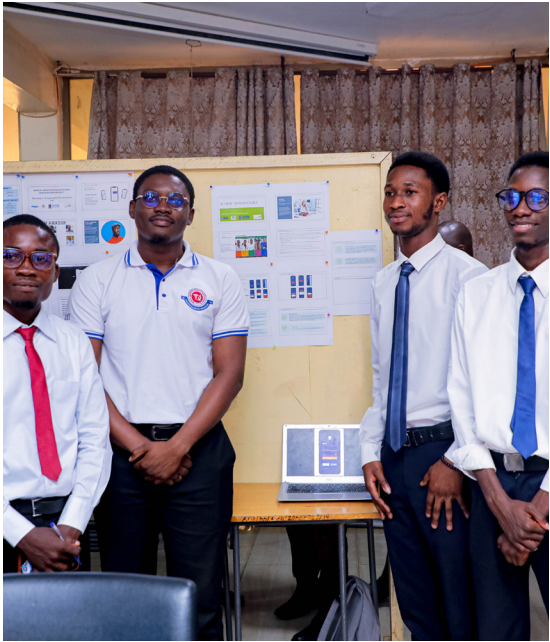# AHRIP IN PICTURES

AHRIP IN PICTURES
EXHIBITION PICTURES

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**AFRICA HEALTH RESEARCH AND
INNOVATION PROJECT (AHRIP)**

2023

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