iSchool Ethiopia Field Design Study: Technology Education in Addis Ababa

by Gunner Dohrenwend

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Professors: Jaime Snyder, Temi Odumosu

University of Washington

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Terminology

AAU	Addis Ababa University
SIS	School of Information Sciences at Addis Ababa University

Design Space

Tech Sector

The tech sector in Addis Ababa is rapidly expanding, seen in part through the adoption and ubiquity of smart cellular devices and the increased coverage of 4G and 5G cell service. The market is mostly controlled by a few major players, specifically banks, construction companies, IT services, and government-owned Ethio Telecom which currently has a monopoly over all telecommunications services in Ethiopia. Employees at these large companies usually have a college education, and a majority of Master's students at SIS have their education funded by their employers.

Alongside the dominant reigns of these large companies, there has also been a growth in the number of local tech repair and tech sales businesses in Addis Ababa, whose employees are usually self-taught through non-university classes, independent internet research, and work experience.

University Education, AAU and the Job Market

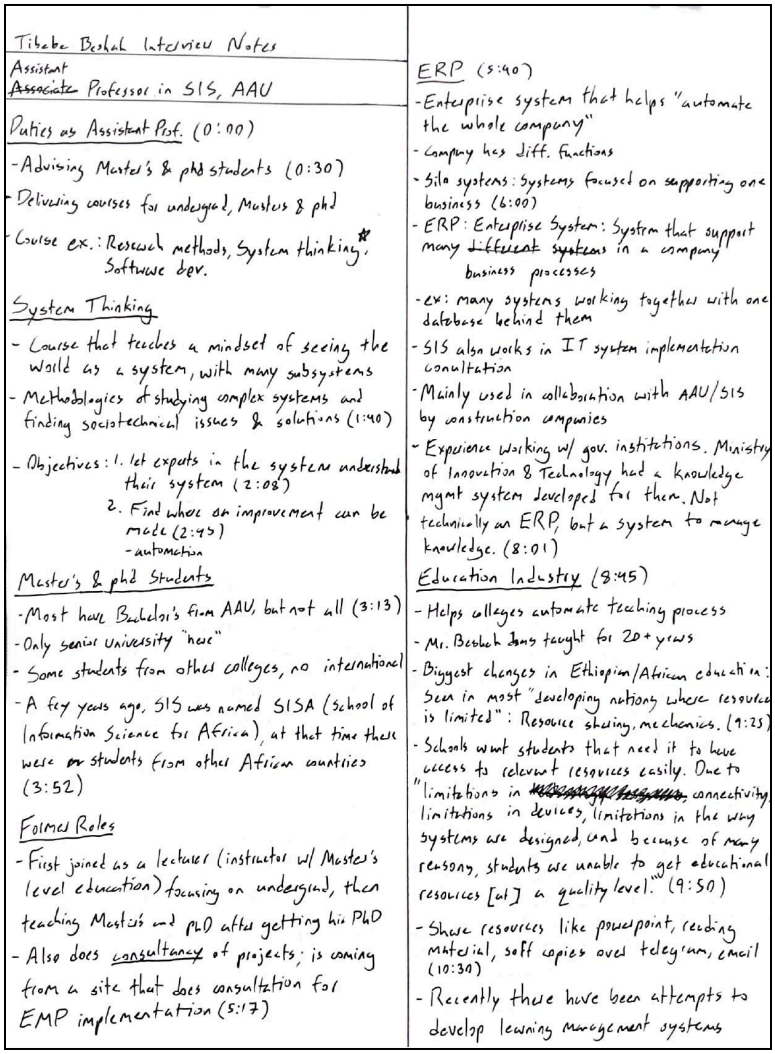
Specialized tech education is increasing in demand, especially related to software engineering and electrical engineering. Software engineering courses focus on the largest and most influential languages globally, including Python, Java, HTML, and C++. Courses are influenced by the demands of the job market, and platforms like Moodle, Telegram, and Google Classroom are used to provide resources to students and allow them to turn in assignments online. All courses at the SIS are in-person, but resources are provided to students who need to miss a day or a few days. Problems with infrastructure and access to new technology still pose challenges that universities need to work around.

Local companies look to hire students out of the engineering program at AAU, but many students opt to pursue remote work instead. Companies like Turing, UpWork, and WellFound provide online platforms for programmers to connect to businesses internationally. A degree is not usually required for this contract-driven form of employment, but contracts are still competitive.

Data Collection Methods

Tibebe Beshah, PhD

- Assistant Professor at the SIS
- Approx. 30 minutes
- **Key topics**: Master's and PhD students, system thinking, learning management systems, infrastructure, automation



Tibebe Beshah Interview Notes

Assistant ~~Associate~~ Professor in SIS, AAU

Duties as Assistant Prof. (0:00)

- Advising Master's & phd students (0:30)
- Delivering courses for undergrad, Masters & phd
- Course ex.: Research methods, System thinking*, Software dev.

System Thinking

- Course that teaches a mindset of seeing the world as a system, with many subsystems
- Methodologies of studying complex systems and finding sociotechnical issues & solutions (1:40)
- Objectives: 1. let experts in the system understand their system (2:08)
  2. Find where an improvement can be made (2:45)
  - automation

Master's & phd Students

- Most have Bachelor's from AAU, but not all (3:13)
- Only senior university "here"
- Some students from other colleges, no international
- A few years ago, SIS was named SISA (school of Information Science for Africa), at that time there were no students from other African countries (3:52)

Former Roles

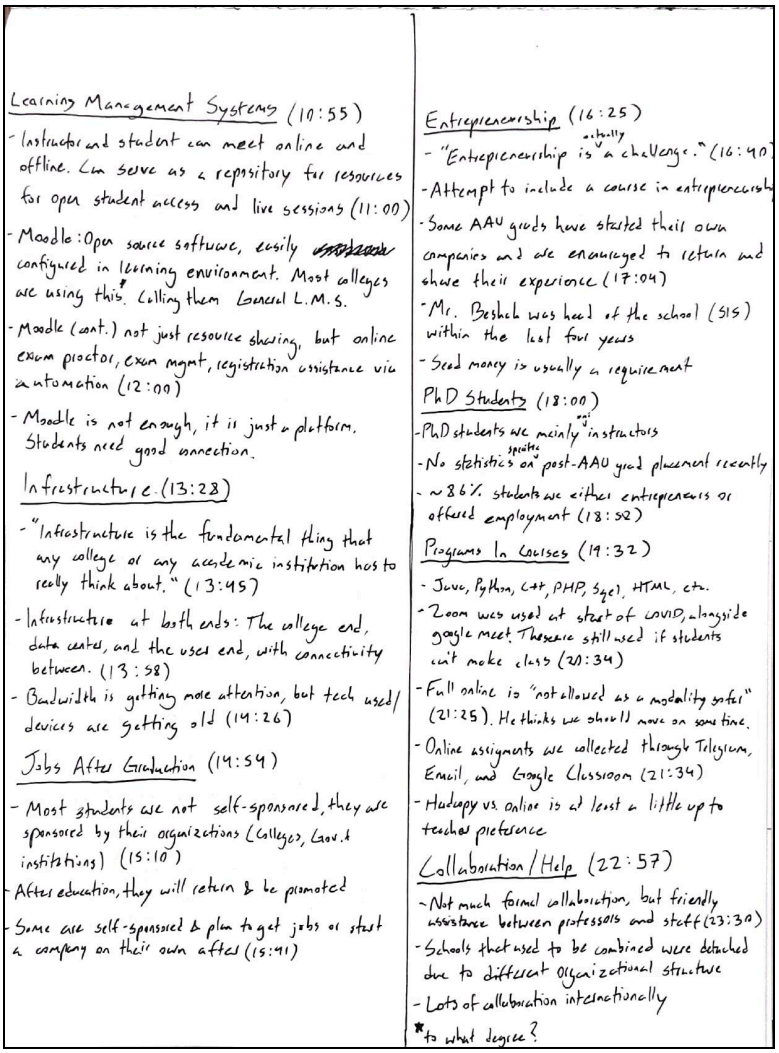
- First joined as a lecturer (instructor w/ Master's level education) focusing on undergrad, then teaching Masters and PhD after getting his PhD
- Also does consultancy of projects; is coming from a site that does consultation for EMP implementation (5:17)

ERP (5:40)

- Enterprise system that helps "automate the whole company"
- Company has diff. functions
- Silo systems: Systems focused on supporting one business (6:00)
- ERP: Enterprise System: System that support many ~~different systems~~ in a company business processes
- ex: many systems working together with one database behind them
- SIS also works in IT system implementation consultation
- Mainly used in collaboration with AAU/SIS by construction companies
- Experience working w/ gov. institutions. Ministry of Innovation & Technology had a knowledge mgmt system developed for them. Not technically an ERP, but a system to manage knowledge. (8:01)

Education Industry (8:45)

- Helps colleges automate teaching process
- Mr. Beshah has taught for 20+ years
- Biggest changes in Ethiopian/African education: Seen in most "developing nations where resource is limited": Resource sharing, mechanics. (9:23)
- Schools want students that need it to have access to relevant resources easily. Due to "limitations in ~~[illegible]~~ connectivity, limitations in devices, limitations in the way systems are designed, and because of many reasons, students are unable to get educational resources [at] a quality level." (9:50)
- Share resources like powerpoint, reading material, soft copies over telegram, email (10:30)
- Recently there have been attempts to develop learning management systems



Learning Management Systems (10:55)

- Instructor and student can meet online and offline. Can serve as a repository for resources for open student access and live sessions (11:00)
- Moodle: Open source software, easily ~~[illegible]~~ configured in learning environment. Most colleges are using this. Calling them General L.M.S.
- Moodle (cont.) not just resource sharing, but online exam proctor, exam mgmt, registration assistance via automation (12:00)
- Moodle is not enough, it is just a platform. Students need good connection.

Infrastructure (13:28)

- "Infrastructure is the fundamental thing that any college or any academic institution has to really think about." (13:45)
- Infrastructure at both ends: The college end, data center, and the user end, with connectivity between. (13:58)
- Bandwidth is getting more attention, but tech used/devices are getting old (14:26)

Jobs After Graduation (14:54)

- Most students are not self-sponsored, they are sponsored by their organizations (Colleges, Gov.t institutions) (15:10)
- After education, they will return & be promoted
- Some are self-sponsored & plan to get jobs or start a company on their own after (15:41)

Entrepreneurship (16:25)

- "Entrepreneurship is virtually a challenge." (16:40)
- Attempt to include a course in entrepreneurship
- Some AAU grads have started their own companies and are encouraged to return and share their experience (17:04)
- Mr. Beshah was head of the school (SIS) within the last four years
- Seed money is usually a requirement

PhD Students (18:00)

- PhD students are mainly ~~[illegible]~~ instructors
- No statistics ~~[illegible]~~ on post-AAU grad placement recently
- ~86% students are either entrepreneurs or offered employment (18:52)

Programs In Courses (19:32)

- Java, Python, C++, PHP, Sql, HTML, etc.
- Zoom was used at start of COVID, alongside google meet. Those are still used if students can't make class (20:34)
- Full online is "not allowed as a modality safer" (21:25). He thinks we should move on sometime.
- Online assignments are collected through Telegram, Email, and Google Classroom (21:34)
- Hardcopy vs. online is at least a little up to teacher preference

Collaboration / Help (22:57)

- Not much formal collaboration, but friendly assistance between professors and staff (23:30)
- Schools that used to be combined were detached due to different organizational structure
- Lots of collaboration interactionally

*to what degree?

cont. (24:20)

- UGA, Kennesaw St, others. (24:49)
- Professors from AAU also leave to other Ethiopian schools to teach at a master's level for short (~2 week) modules (25:24)
- Not a formal collaboration, "They just give me a call."

Gov.t Programs & AAU Enrollment (26:20)

- Ethio Telecom is a big sponsor
- Ethio Telecom CEO is an AAU grad & now board chair of university (26:49)
- Most employees at Ethio Telecom, Ethiopian Airlines, and (comm. bank of Ethiopia) Banking industry, IT companies (26:39)
- Banking industry, E.T., Gov.t institutions, IT-related companies usually hire our students. (28:20)
- IT company: "companies engaged on software development, systems development, networking, and providing IT service in general." (28:45)
- Self-sponsored students search for jobs with these same companies (29:30)

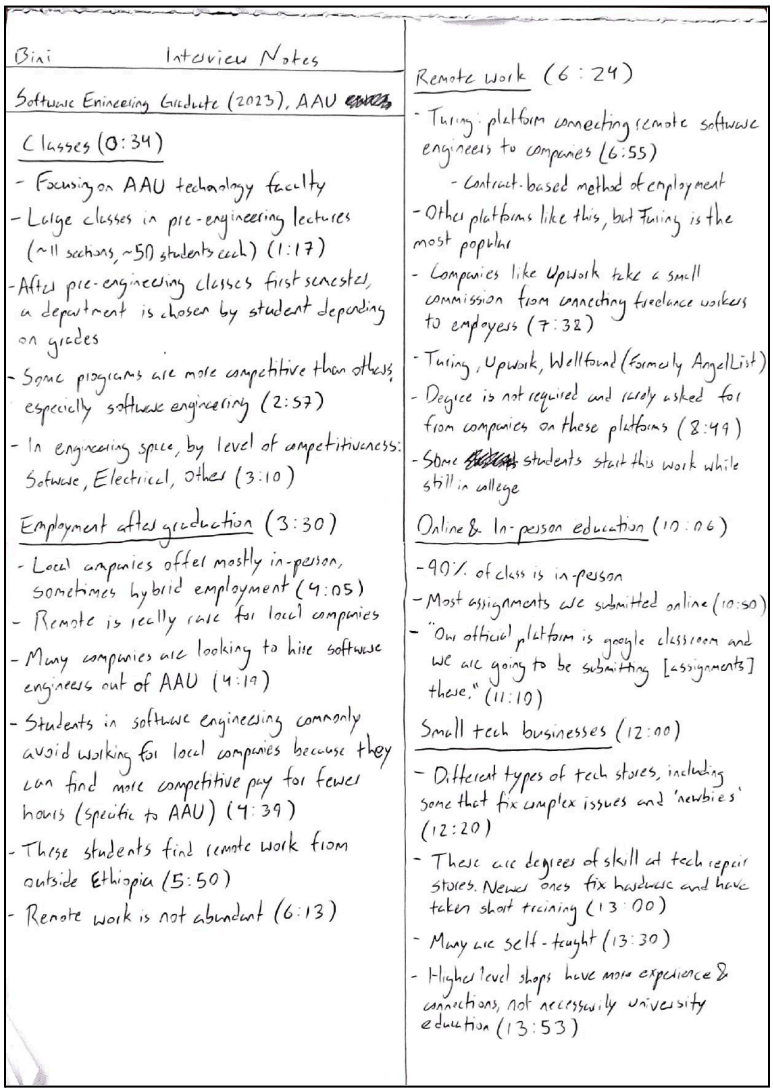
IT startups (29:40)

- Lots of startups in the field & other fields
- IT is a booming industry
- The last few years have been great for IT, especially last 10 years where tech connectivity has significantly increased (30:30)

11:00 12:00
14:34 20:20
19:32
20:34
21:34

Bini Abiy

- Software Engineering Graduate from AAU
- Approx. 20 minutes
- **Key topics**: Remote work, employment, classes, online resources, pre-college tech education



Bini Interview Notes

Software Engineering Graduate (2023), AAU [redacted]

Classes (0:34)

- Focusing on AAU technology faculty
- Large classes in pre-engineering lectures (~11 sections, ~50 students each) (1:17)
- After pre-engineering classes first semester, a department is chosen by student depending on grades
- Some programs are more competitive than others, especially software engineering (2:57)
- In engineering space, by level of competitiveness: Software, Electrical, Other (3:10)

Employment after graduation (3:30)

- Local companies offer mostly in-person, sometimes hybrid employment (4:05)
- Remote is really rare for local companies
- Many companies are looking to hire software engineers out of AAU (4:19)
- Students in software engineering commonly avoid working for local companies because they can find more competitive pay for fewer hours (specific to AAU) (4:39)
- These students find remote work from outside Ethiopia (5:50)
- Remote work is not abundant (6:13)

Remote work (6:24)

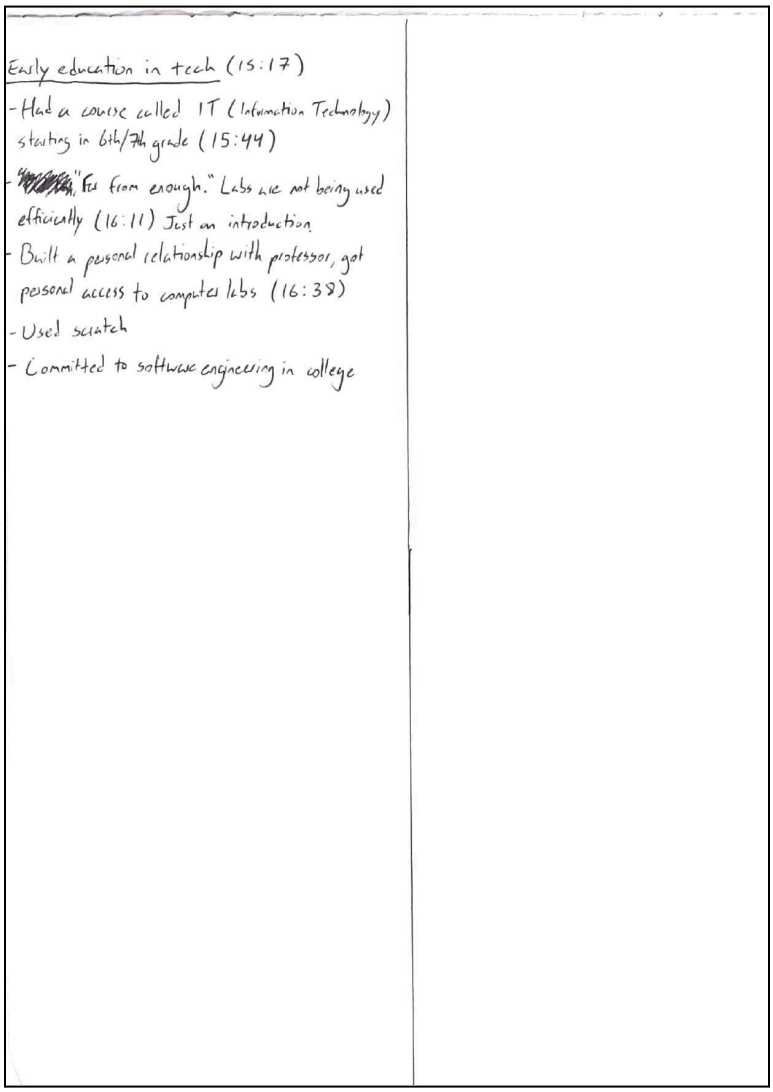
- Turing: platform connecting remote software engineers to companies (6:55)
  - Contract-based method of employment
- Other platforms like this, but Turing is the most popular
- Companies like Upwork take a small commission from connecting freelance workers to employers (7:32)
- Turing, Upwork, Wellfound (formerly AngelList)
- Degree is not required and rarely asked for from companies on these platforms (8:49)
- Some [redacted] students start this work while still in college

Online & In-person education (10:06)

- 90% of class is in-person
- Most assignments are submitted online (10:50)
- "Our official platform is google classroom and we are going to be submitting [assignments] there." (11:10)

Small tech businesses (12:00)

- Different types of tech stores, including some that fix complex issues and 'newbies' (12:20)
- These are degrees of skill at tech repair stores. Newer ones fix hardware and have taken short training (13:00)
- Many are self-taught (13:30)
- Higher level shops have more experience & connections, not necessarily university education (13:53)



Early education in tech (15:17)

- Had a course called IT (Information Technology) starting in 6th/7th grade (15:44)
- [redacted] "Is from enough." Labs are not being used efficiently (16:11) Just an introduction
- Built a personal relationship with professor, got personal access to computer labs (16:38)
- Used scratch
- Committed to software engineering in college

Surveys

11 responses from 8 different locations

- Ethio Telecom: 3 (two different locations)
- Abulu Mobile: 2
- Market Mobile: 2
- Yonatan Mobile
- Ebrahim Phone
- Kings Mobile
- Alpha Mobile Center

6 rejections

Trends in Surveys

- 100 percent of stores surveyed sold electronic products, and ~36 percent also fixed broken devices
- 2 out of 3 Ethio Telecom employees had university education, and only 2 of the other eight responses from local businesses had university education
- When faced with a problem that an employee can't solve, most surveyed chose to look it up online rather than turn away the customer
- 3 responses said that employees were usually hired online, 5 through recommendations, 3 from job fairs, and 2 from walk-ins
- When questioned about competition in the tech service industry, 5 said there was a lot of competition, 3 said there was some competition, and 3 said there was little competition. None said that there was no competition.

Design Research Question

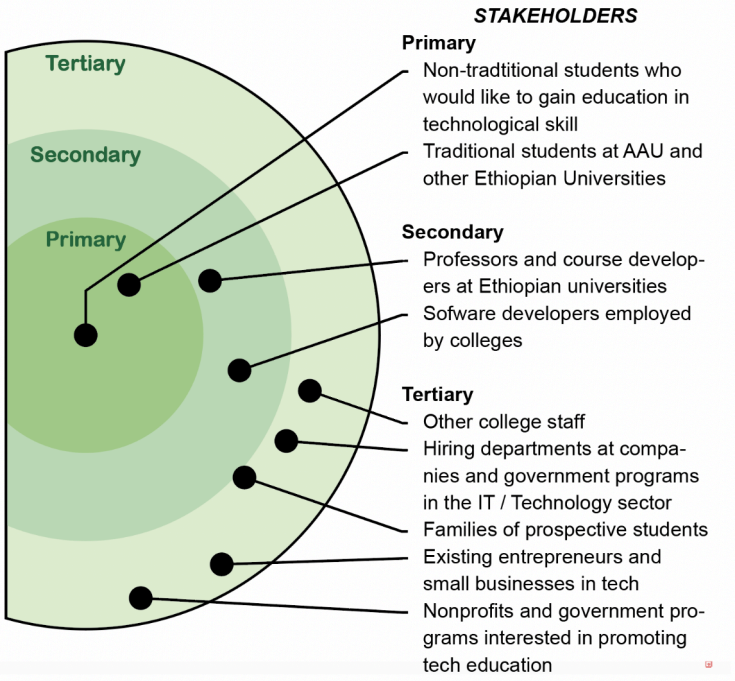
How can tech education in Addis Ababa be impacted to achieve a state where more potential students are able to receive education and gain careers in the tech space while respecting the current education landscape?

"impact tech education" - introduce a system or product that positively changes different points of education, such as how many students receive education or the quality of resources given to prospective, current, and former students.

"Respecting current education landscape" - creating an intervention that is informed to the factors influencing education in Addis Ababa (infrastructure, culture, different levels of access to technology in areas of Addis Ababa, etc.), and respecting the teaching styles of staff.

Stakeholder Map

Type of Stakeholder	Definition
Primary Stakeholder	Direct users of the tool or system of intervention
Secondary Stakeholder	Those impacted by users of the intervention tool
Tertiary Stakeholders	Those not directly impacted by system of intervention, but are aware of influence and whose support / influence impacts success of intervention

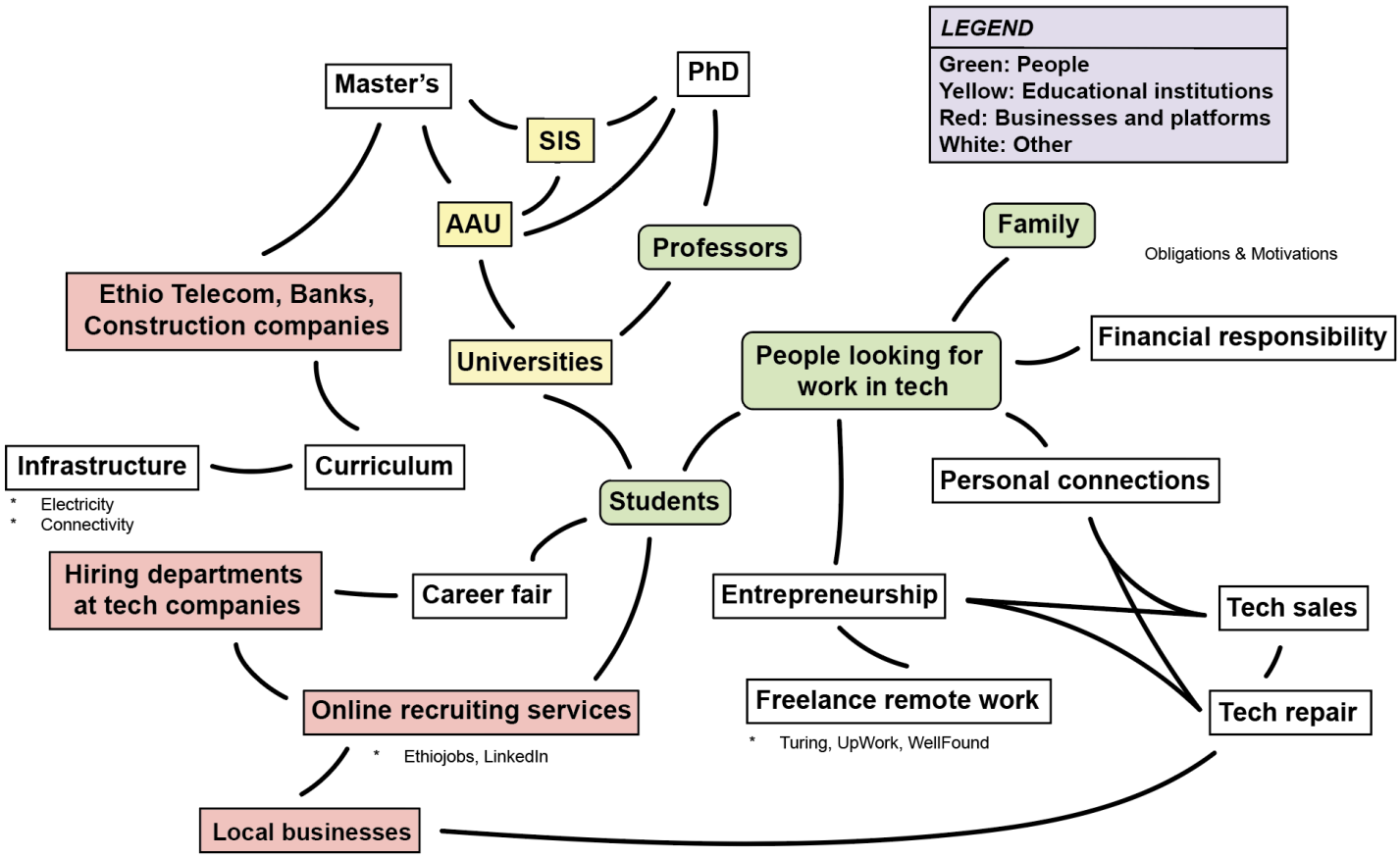


Group	Focusing Questions	Data collection
Those who would like to pursue higher education but cannot	- How can we better understand the limitations that make enrolling in university a challenge to some? - What type of technology do young adults in Addis Ababa have access to?	- Informal interviews and conversations - Observation - Information / Data collection from existing studies and articles
Students who have enrolled in Ethiopian universities	- What does technology education in university look like from a student perspective? - What types of jobs and careers are graduates planning for?	- Formal interviews - Informal interviews and conversations

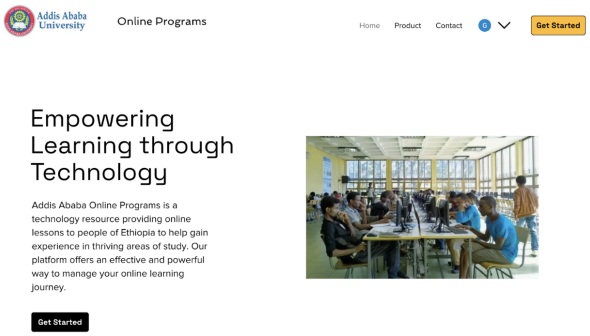
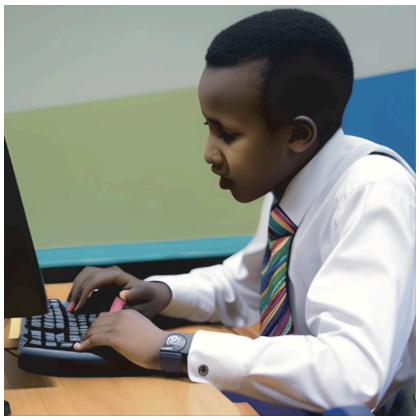
Group	Focusing Questions	Data collection
Professors and course developers at Ethiopian universities	- What are the duties and functions of professors in Addis Ababa? - How are these functions shaped by infrastructure and culture?	- Formal interviews - Informal conversations and input on research and design
Software developers employed by the college	- What is the feasibility of introducing a new system into an existing university?	- Information / Data collection from existing studies and articles

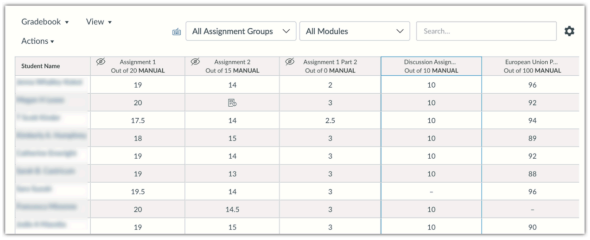
Group	Focusing Questions	Data collection
Hiring departments in IT / Technology companies	- What technical skills are companies looking for in their employees? - How necessary is a college degree to work in different jobs in this field?	- Surveys - Information / Data collection from former studies and articles
Existing entrepreneurs and small businesses in tech	- What technical skills are demanded by customers in the current economic landscape? - What is the education level of those working in smaller tech businesses?	- Surveys - Informal interviews and conversations - Observation

System Diagram



Intervention Narrative

AAU ≠ Potential Student * Cost * Family obligation * Distance * Transportation * Lack of time	Students who cannot enroll in in-person classes at a 4-year University sign up for an AAU online program teaching a technical skill. Tuition for this course is cheaper than in-person education.
	Student gets access to low bandwidth resources that still provide valuable information about the area of study. The curriculum is based on the current needs of the tech market, and may be advised by companies hiring in the space.
	An online student works asynchronously and at their own pace, around other responsibilities that they may have.

	Work is submitted and graded online by professors at AAU. Students receive feedback on assignments and are given a grade.
	If an online student completes the course, they are given a certificate of completion proving that they have completed the work load.
	Students are able to use their technical skill to apply for jobs in the tech space, or use that knowledge to create their own product or pursue other self-employment ventures.

Limitations and Next Steps

Limitations

- It would be impossible to understand and take into account every facet of the technology education and tech industry space in Ethiopia in the course of this three-week program, and there is much more to look into.

- It should also be acknowledged that this research and design intervention was made by a person from outside of Ethiopia, thus inevitably missing some awareness and understanding of the realities of truly living in Addis Ababa.

- A language barrier could also impact the type of information some stakeholders were willing to share, especially in the case of the surveys given.

- However, with these limitations, I believe that the information I have gathered is accurate and that much progress was made into understanding tech education in Ethiopia.

Next Steps

If this design prototype were to be implemented, there would be a few steps required to roll it out:

- Development of online courses in subjects like IT, software engineering, device repair, and data science
    - This would include both organization of the course and web development
- Staff training in the operations of the new course
- Marketing of new course in Addis Ababa
- Approval of courses from major hirers in tech space