
Can HCI Replicate the Intangible Gains of International Exposure? A Case Study in Rwanda

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Abstract

What do developing country residents gain from international exposure? And, is it possible that such gains could be learned over the Internet, such as through MOOCs? We seek to answer an aspect of these questions by investigating the expectations and experiences of two groups of Rwandans: those planning to go abroad to study, and those who already had experience abroad. In contrast to knowledge or skills that participants before study abroad expect to gain, participants with experience abroad highlight significant shifts in attitudes, such as an appreciation of focusing on quality. They also note an increase in their motivation to work and to change Rwandan society. We discuss how the difference between the two groups of participants can be explained in the context of brain circulation and self-efficacy. Afterward, we discuss whether technology and HCI can substitute for or mitigate the need for physical international exposure.

Author Keywords

MOOCs; Rwanda; brain circulation; international exposure; HCI; self-efficacy; motivation;

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

Introduction

A key factor in the growth of the ICT industry is human resource development. One major impediment to this talent development is “brain drain.” Ng’ambi [9] writes that Africa in particular is challenged by massive brain drain of higher education graduates who go on to apply their skills in other locales. By some estimates, 37.4% of Silicon Valley software engineers were born outside the United States [6]. For developing countries who desire high-quality human capital to assist in the development of their economies, the effects of brain drain are especially acute.

Contrasting with this loss of talent are the foreign-born or second-generation engineers who decide to return to their country of origin bringing with them broad skills and business networks. This return of cultivated talent is called “brain circulation,” and can play a critical role in some countries’ IT-sector development—particularly countries such as India, Israel, and Taiwan [12]. Saxenian [12] asserts that the conditions of brain circulation are 1) governments that have invested heavily in higher technical education, and 2) stability of politics and economy. The second condition includes policies around investment and entrepreneurship, such as openness to foreign investment and a conducive business environment.

While the brain drain of educated citizens is a challenge in many African countries, brain circulation is also evident in some countries in Africa, where individuals have begun to return home because of increased

opportunities in the technology sector. Avle [1] interviewed 14 returnees who manage small-size or medium-size companies in Ghana, finding that returnees work as a catalyst for economic growth. They bring up-to-date technical knowledge and financial capital for business back to burgeoning economies. She also points out that international exposure is integral in order to obtain management and strategic skills that can make individuals competitive on a global scale.

Rwanda is one example of a developing country that feels the effects of both brain drain and brain circulation. In a desire to transform itself into a middle-income country, Rwanda is currently pursuing an ICT-based economic development strategy. To accomplish this, the Rwandan government strongly encourages entrepreneurship and innovation as a means to create jobs and expand the ICT market [8, 11]. As an indication of all it has already achieved, Rwanda is ranked second in Africa in the ease of doing business [15] and lack of government corruption [13]. However, Rwanda’s economy and ICT industry are still immature. The country is ranked 159th in the Human Development Index [14] overall and with respect to educational achievement. The ICT Readiness index, based on ICT access, use, and skills, also ranks Rwanda 150th [5]. These rankings are among the world’s lowest 15%. Rwanda still has a long way to go and thus stands to benefit from increased brain circulation.

But, what exactly do developing-world residents gain from their time abroad? In an age of global digital communication, is physical travel required to gain the knowledge and experience necessary to grow an economy? For example, Massive Open Online Courses (MOOCs) allow anyone with an Internet connection to

access content taught by strong teachers at the world's best institutions. Zhenghao et al. [16] claim that MOOCs have benefits for students in both educational and career development, especially in developing countries. Bezy [10] proposes that MOOCs can improve teaching by professors around the world, as well. Maitland & Obeysekare [7] suggest that the participants of the American MOOC Camp program in developing countries obtained global exposure capital through being exposed to foreign ideas and different ways of learning and doing. These studies suggest that digital tools, like MOOCs, stand to benefit developing countries in ways beyond just technical skill transfer.

So, can the benefit of physical brain circulation, especially international exposure, be facilitated by technologies? We seek to answer an aspect of this question by investigating the expectations and experiences of two groups of Rwandans: those planning to go abroad to study, and those who already had experience abroad. After presenting our findings, we discuss potential entry points for Human-Computer Interaction (HCI) research.

Methodology

Face to face semi-structured interviews were conducted with two groups: 1) Rwandans who were planning study abroad, and 2) Rwandans who had some experience studying abroad.

The first group was composed of ten Rwandan participants (eight men and two women) who were about to depart for master's programs abroad. They were the candidates of a Japanese government-funded program, which consisted of a two-year master's program and a six-month internship in Japan. They

were in their twenties with bachelor's degrees in IT-related majors. Henceforth, this group will be called "Group 1." Group 2 is comprised of nine Rwandan participants (seven men and two women) who had graduated from or are pursuing master's programs in the United States, South Africa, Belgium, and Japan. Three of them had already come back to Rwanda, and six of them were still studying in Japan at the time of the interviews. All of them majored in IT-related subjects. The interviews consisted of open-ended questions regarding the expectations of studying abroad and, for Group 2, the gains in studying abroad.

The participants were chosen through contacts with both the Rwandan and Japanese governments and snowball sampling. Interviews in Rwanda were held at the Rwanda ICT Chamber's kLab—an innovation hub in Kigali—or interviewee offices. Participants interviewed in Japan, were interviewed in their university in Kobe, Japan. Interviews were transcribed and thematically analyzed for recurring themes.

Findings

We first make a general remark that all the participants responded that they planned to come back to Rwanda after their studies. This is somewhat surprising, and responses may have been influenced by the fact that someone affiliated with a donor organization for their programs was asking the questions, but the Rwandan government has also cultivated a culture of citizens contributing to the country. In any case, we interpret their responses to mean that the participants have at least some intention to gain something from studying abroad that they would like to bring back to Rwanda.

The remainder of the findings are organized around the three most salient issues that emerged in a comparison of Group 1 and Group 2 participants.

Types of skill learned: Group 1 participants tended to highlight technical skills—either in engineering or business—as an anticipated learning. For example, one participant noted, “I want to develop my capacity so that I can have solutions that can affect more people.”

On the contrary, Group 2’s answers highlighted non-technical attitudes toward their work, such as the importance of punctuality, work quality, or customer service. One participant said, “When I had a task in Rwanda, I gave all my effort to finish that task as soon as possible. But here in Japan, the process is important. The quality of what we deliver is very important, so we must have time to think again and again.” One returnee from South Africa concluded that the higher education in Rwanda was overly theoretical, and that Rwanda universities could teach more practical skills.

Crucially, many of these non-technical insights came from cross-cultural comparisons that participants made in their daily life, and *not necessarily in their formal education*. A current student in Japan was impressed by the country’s customer service: “When I went to a post office, I saw how they treat customers. Even if they’re busy, they come and tell you what they are doing and say, ‘Please wait.’ This small effort makes customers feel good.” A returnee from Japan says, “Even the small restaurants, even the small bars, they’re very innovative. If you want to order a beer, you don’t need to ask. You just press buttons ... There are innovations in everything.”

Increased motivation: Many Group 2 participants noted an increase in their motivation to work and to change Rwandan society. The same participant who was impressed by innovation in small bars said, “When I came back here (to Rwanda), I want to focus on innovation. [Studying in Japan] changed me.” Another student still studying in Japan answered, “When I go back there, I change my working style. I meet my deadlines, and I improve the quality of work that I do. I think they will see huge change because of the switch of my working style.” Yet another student studying in Japan said, “What I can bring to Rwanda is to try to improve our behavior more. Try to get organized. People should be humble.”

At least from the interviews, it is not entirely clear what caused these increases in motivation. We hypothesize two possibilities that are hinted at in participant comments. First, the encounter with a foreign culture makes people aware of new possibilities, which they perceive to be exciting. Second, there may be a mechanism similar to that which people feel when they encounter role models: “If this country can do it, we should be able to do it, too!”

International social capital: Both Group 1 and Group 2 participants noted the importance of meeting others and growing their networks. Here students’ expectations are matched by their experiences abroad. A strong network is also one of five factors required for ICT export success according to Heeks & Nicholson [4]. One Group 1 participant said, “I’m looking forward to having different connections with different people. The connection is very important with maybe companies or individual people.”

One Group 2 participant noted an increase in social self-efficacy, which is defined as people's belief about their capabilities to organize and accomplish required tasks with a designated level of performance [3]: "I can cooperate with many people, even Japanese included. I'm still focusing on developing my start-up with partnering with other peoples." Internships can further boost these kinds of interactions. Another Group 2 participant has already started a company based on a recent study-abroad experience, funded by his internship host company: "We wanted to develop applications around the Internet of Things, data-driven solutions. We found out that to be able to get good partners, like Japanese companies, or to get clients, it was good to have a business together rather than individually."

Discussion

We begin by discussing how the difference between our two groups of participants can be explained in the context of brain circulation and self-efficacy. Afterward, we discuss whether technology can substitute for or mitigate the need for physical international exposure.

Reassessing development: Group 1 participants tended to expect short-term or direct benefits from their studies abroad. They emphasized knowledge, skills, and human connection. Many Group 2 participants, however, remarked on the gap between their home and host countries, and did so in a way that suggested internal changes as a result. International exposure and life in a different culture seems to grant several types of epiphanies: (1) an outside perspective of their home country; (2) a recognition of the magnitude of the gap between the developed and developing world; (3) a sense for the social

characteristics associated with economic development; and (4) new approaches to encouraging development, based on host-country examples. In contrast to Avle [1], who found that technical knowledge, financial capital, and global-level business skills are the benefits of brain circulation, we propose that a reassessment of what development means, as well as sensitivity to the everyday attitudes and customs that might be a cause of developed-country status are also critical benefits of brain circulation.

In addition, as we saw with Group 2 participants who returned with increased motivation to change their home country, the experience of international exposure seems to improve self-efficacy. Bandura [2] theorizes that there are four ways to increase self-efficacy—through personal success, vicarious experience, encouragement, or positive mood. Studying abroad could be enforcing a sense of personal success, while seeing the everyday strengths of a developed country could provide vicarious experience.

HCI and physical brain circulation: What are the key differences between the physical experience of studying abroad and learning on the Internet, such as through MOOCs? It seems clear that technical skills and knowledge can be learned online. Unlike other educational contexts where lack of student motivation is a hurdle, there is plenty of motivated talent in Rwanda as our Group 1 participants demonstrated. The fact that few of our Group 2 participants emphasized technical skills or knowledge also suggests that either they did not see what they learned abroad technically to be beyond what they could have learned at home or that they recognized the greater importance of the new attitudes they gained abroad.

With respect to the non-technical knowledge and skills mentioned in our findings, however, we believe it is not easy to replicate the experience digitally. First, there are some crucial experiences that are not readily turned into online experiences. Consider even the simple case of the participant who was impressed by Japanese customer service. In a sense, the mundaneness of an everyday transaction was required as a stage on which a striking customer service event was experienced. Purchasing goods from Japan online, or teleconferencing with a merchant overseas cannot easily convey this combination of the everyday with the exotic. And attempts to contrive such an experience digitally would be just that—contrived.

Second, it is salient that none of our Group 1 participants mentioned any expectation of this kind of learning. Simple online searches link to considerable information online about foreigners' experiences living and working in Japan (for example), but such information was not sought by any of our Group 1 participants. They did not know even to ask.

Third, it is not clear that even with the foresight to seek out such information, that it would have anything like the power of direct experience. Some of our Group 2 participants seemed to return from their study-abroad programs with a tinge of religious conversion. They had experienced a different world; they had new convictions; and they wanted others to feel what they felt. In our global age, all of us have seen video footage of life abroad in many countries, and with virtual reality, those experiences will be further heightened. But, they will *still* not allow us to shake hands with locals, smell scents wafting in the air, or feel the loss of balance that comes when one is not anywhere near home.

For HCI, we believe that this means that the focus should *not* be on attempts to replace or substitute for experiences abroad. Following Maitland & Obeysekare [7], maybe digital tools and online courses can be applied to support and buttress overseas experiences. How can the new attitudes, social capital, and soft skills gained abroad be best maintained at a distance and over time? Are there ways to nudge people abroad to experience more frequent epiphanies while there? What might online courses do to best prepare a person for a study-abroad experience, such that people gain the most from their precious time overseas?

In the end, good brain circulation seems to require physical travel... but there may be many ways in which digital technologies can add value to time abroad.

Conclusion

A comparison between Rwandan participants before and after study abroad shows that the intangible gains from international exposures are shifts in attitude toward professional work, new motivation to change society at home, greater self-efficacy, and international social capital. While it seems difficult to reproduce these benefits of direct international exposure online, technology seems likely to be able to augment offline experiences. Future research could consider how the Internet and other technological tools could better prepare people for international experiences, or how they could augment the value of such experiences during or afterward.

References

- [1] Avle, S. 2014. Articulating and Enacting Development: Skilled Returnees in Ghana's ICT Industry. *Information Technologies & International Development*. 10, 4 (2014), 1–13.
- [2] Bandura, A. 1977. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*. 84, 2 (1977), 191–215.
- [3] Bandura, A. 1986. *Social foundations of thought and action: A social cognitive theory*.
- [4] Heeks, R. and Nicholson, B. 2002. Development Informatics Success Factors and Developing and Economies. (2002).
- [5] International Telecommunication Union 2016. *Measuring the Information Society Report*.
- [6] Joint Venture Silicon Valley and Institute for Regional Studies 2016. 2016 Silicon Valley Index People Joint Venture Silicon Valley Officers. (2016).
- [7] Maitland, C. and Obeysekare, E. 2015. The Creation of Capital through an ICT-based Learning Program: A Case Study of MOOC Camp. *ICTD 2015*. (2015).
- [8] Ndayishimiye, A.N. and Kanamugire, N. 2015. *Entrepreneurial Infrastructure For The Development of Entrepreneurs in Rwanda*.
- [9] Ng'ambi, D. 2006. ICT and Economic Development in Africa: The Role of Higher Education Institutions. *ICT and Economic Development in Africa: The role of Higher Education Institutions*. November (2006), 1–33.
- [10] Raising the Bar in Africa's Higher Education : Ten Principles to Improve Higher Education in Africa: 2016. <http://brel54.blogspot.com/2016/05/raising-bar-in-africas-higher-education.html>.
- [11] Republic of Rwanda 2016. *SMART Rwanda Master Plan 2015 - 2020*.
- [12] Saxenian, A. 2005. From brain drain to brain circulation: Transnational communities and regional upgrading in India and China. *Studies in Comparative International Development*. 40, 2 (2005), 35–61.
- [13] Transparency International 2016. *Corruption perceptions index*.
- [14] UNDP 2016. *Human Development Report 2016 Human Development for Everyone*.
- [15] World Bank Group 2017. *Doing Business 2017: Equal Opportunity for All*.
- [16] Zhenghao, C. et al. 2015. Who's benefiting from MOOCs, and why. *Harvard Business Review*. (2015), 1–11.



January 31, 2018

Dear HCI Across Borders Organizing Committee,

I am writing to nominate and enthusiastically recommend Mr. Tsuyoshi Kano for the HCI Across Borders Symposium. A third-year PhD candidate in the School of Information at the University of Michigan, Tsuyoshi is smart, diligent, and focused on global IT skill development, particularly in Rwanda and Bangladesh. His larger research context is digital technologies and international development, considered with both an HCI and a sociological lens. In addition to his academic background, he has substantial practical experience in IT and at the Japan International Cooperation Agency (JICA), the Japanese analogue to USAID. He lived and worked for three years in Bangladesh as a representative of JICA, focusing on ICT-related projects that involved smart-cards for public transportation and media strategy.

As a PhD student, Tsuyoshi has conducted research to understand different aspects of IT skill development. In his first PhD project, he sought to understand different career aspirations of IT students in Bangladesh, and how they challenged dominant notions of what global IT workers want. That work is being submitted for publication. Last summer, he did an three-month internship with the Rwanda ICT Chamber, and during the internship conducted qualitative interviews with local IT-sector stakeholders. He interviewed around 30 Rwandans, including government officials, entrepreneurs, software engineers, students, and professors, to explore their thoughts about what was important for the country's IT sector development. Most recently, he has been conducting a longitudinal study tracing the mindset change of young software engineers who have opportunities for international exposure abroad. (Preliminary outcomes from that study are being submitted to HCIxB.)

Tsuyoshi is very capable in doing work that crosses cultures. Apart from his time in Bangladesh and Rwanda, he has also conducted work in Vietnam, the Philippines, and Japan. In all of these projects, he has led the development of key relationships, coordination of research plans, and the implementation of the research.

The opportunity to participate in the HCI Across Borders Symposium will broaden Tsuyoshi's field of view with respect to research, and expand his research network. Most of his work so far has been more sociological in nature – though it deals with the IT sector, the topics focus almost entirely on the people, not on their direct relationships with technology. However, given his

technical background, he is eager to engage with the HCI community, as well. Aspects of this are visible in the HCIxB submission, which connects his work with issues central to HCI. Finally, I believe Tsuyoshi will be an excellent contributor to the symposium, as well. Despite this community's frequent engagement with international development, we see relatively few representatives of large foreign aid organizations. Tsuyoshi's strong connections to JICA (he continues to be a full-time employee there) will bring fresh perspectives.

As his primary PhD advisor, I am confident that Tsuyoshi will gain significantly by participating in the HCIxB Symposium, and conversely, that other participants will benefit from his attendance. Thus, I make a very enthusiastic nomination for Tsuyoshi to join the symposium. Please do not hesitate to let me know if you have any questions.

Sincerely,



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SUMMARY

PhD candidate in School of Information at University of Michigan with broad expertise and strong academic background in ICT and Development (ICTD), especially IT-related career aspiration, IT human resource development, and IT industry development. Practical experiences at a development aid agency (JICA) and an IT firm.

RESEARCH PROJECTS

Intangible gains through the international exposure of Bangladeshi in Japan	2018
ICT and innovation capacity development in Rwanda	2017-2018
The diversity of aspirations for IT jobs in Asia (Bangladesh, Vietnam, and the Philippines)	2016-2017
Geographical diversification in ICTD research	2015-2016

PUBLICATIONS

International Conference on ICT and Development (ICTD) Ann Arbor, USA
Publication/Presentation (Note session adoption via evaluation by two reviewers) 2016
Title: Geographic Diversification of ICTD Research
ACM Digital Library: Proceedings of the Sixth International Conference on Information and Communications Technologies and Development: Notes – ICTD '16

PROFESSIONAL EXPERIENCE

Japan International Cooperation Agency (JICA) <i>Deputy Director</i> <ul style="list-style-type: none">ICT strategy formulation and system development.	Tokyo, Japan 2017-present
Rwanda ICT Chamber <i>Internship</i> <ul style="list-style-type: none">Strategy formulation, project formulation, monitoring and evaluation of ICT industry development and human resource development projects in ICT sector.	Kigali, Rwanda 2017

EDUCATION

University of Michigan <i>PhD in Information</i> <ul style="list-style-type: none">Research topic: ICT and economic development	Michigan, USA 2015-Present
Yokohama National University <i>Master of Information Science</i> <ul style="list-style-type: none">Thesis: Pattern driven extraction of motion relationship and application for meaning analysis from corpus of news articles	Yokohama, Japan 2004