Hello, World: An Internationalization at Home Project for Computing for Social Good

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Introduction

Information technology has connected our world and its citizens in incredible ways. Despite this connectedness, students are often isolated within their "online bubbles" of their own university, city, or country. Technology provides a great opportunity to connect them to a broader global experience. Students' perception of technology is limited to well-known tech companies, particularly those offering technologies they use directly such as a search engines, social media, and other consumer-focused companies. Teaching the concept of computing for social good helps students further bridge the gap between theory and application in a real-world setting [1].

We have developed and piloted a cross-institution activity as part of an Internationalization at Home (IaH) initiative [2] to expose first year computer science students to the concept of computing for social good in an international context. We explore how differences in culture can influence students' perceptions and approaches to computing for social good. Specifically, we had students from a Mexican and a Canadian university discuss how computing for social good could be used to solve issues they faced in their communities.

In this initiative, we combine the concepts of IaH and computing for social good in a single activity. Particularly, we explore the outcomes of an IaH initiative conducted to expose first year computer science students to the concept of computing for social good in an international context. In doing so, we explore how differences in culture can influence students' perceptions and approaches to computing for social good. More specifically, the present study aims to identify similarities and differences in the perception of technology as an instrument of social good between students at Canadian and Mexican Universities.

Methods

The study was designed to understand if students from different countries would perceive the impact and potential of Computing for Social Good to be different. While the question is singular, for statistical robustness a set of five research hypotheses that each include a null and alternative hypothesis were investigated:

- **H10**: The top three social good applications that students choose as most important is not associated with school.
- **H1a**: The top three social good applications that students choose as most important is associated with school.

- **H20**: The *Type of Application* coding received by the students' top application choices is not associated with the school.
- **H2a**: The *Type of Application* coding received by the students' top application choices is associated with the school.

- **H30**: The *Scope of Application* coding received by the students' top application choices is not associated with the school.
- **H3a**: The *Scope of Application* coding received by the students' top application choices is associated with the school.

- **H40**: The *Similarity* coding received by the students' responses to the final survey is not associated with the school.
- **H4a:** The *Similarity* coding received by the students' responses to the final survey is associated with the school.

- **H50**: The *Reaction to Experience* coding received by the students' responses to the final survey is not associated with the school.
- **H5a**: The *Reaction to Experience* coding received by the students' responses to the final survey is associated with the school

Participants

The initiative included students from MacEwan University located in Edmonton, Alberta, Canada and Tecnológico De Monterrey located in Guadalajara, Jalisco, Mexico. All students were enrolled in an introductory Computer Science course in the Winter term of 2017. Participation was optional, but extra credit was an incentive.

Overall, 32 Canadian and 52 Mexican students participated in the first survey, 20 Canadian and 26 Mexican students in the second survey, and 17 Canadian and 18 Mexican students in both the virtual discussions and the third and final survey.

Activities

At the beginning of the term, students from each school were given a presentation introducing them to the concept of technology and computing for social good. Specifically, the presentation involved discussions of how computing can be used to solve issues in various communities. Emphasis was placed on the ability of the creators of such apps to determine a need in their community and create a technological solution to address that need.

The students then completed a series of activities:

Survey 1: Students were asked to identify issues in their community and propose two to three applications that could help solve these issues. From the results, a set of *common* applications were determined.

Survey 2: Students chose three of the common applications that they thought were most important and explained how their choice could contribute to social good.

Videoconference discussions: Involved between one and three students from each school. Students took turns discussing their top three chosen apps from the second survey.

Survey 3: Students reflected on their experience in participating in the IaH initiative and answer if they enjoyed the experience, whether they felt the experience was valuable, and how their experience influenced both their ideas about computing for social good and perceptions of Canadian and Mexican culture.

Table 1: Survey 1 *Type of Application* Codings

Canadian University		Mexican University	
Type of Application Coding	**Percentage of Times Coded**	**Type of Application Coding**	**Percentage of Times Coded**
Networking	32.8	**Networking**	26
Education	21.9	**Productivity**	23.1
Productivity	17.2	**Education**	19.2
Health	10.9	Health	14.4
Security	9.4	Environment	7.7
Jobs	4.7	Other	5.8
Environment	3.1	Security	2.9
Other	0	Jobs	1.0

Table 2: Survey 2 *Type of Application* Codings

Canadian University		Mexican University	
Type of Application Coding	**Percentage of Times Coded**	**Type of Application Coding**	**Percentage of Times Coded**
Education	35	**Education**	28.2
Networking	21.7	**Security**	24.4
Security	20	**Networking**	15.4
Jobs	8.3	Health	15.4
Health	8.3	Jobs	9.0
Environment	6.7	Productivity	3.8
Productivity	0	Environment	3.8
Education	35	Education	28.2

Results

Thematic Analysis

Thematic coding was used to compare the application choices made by each of the students in the first two surveys. Coding is a common analysis technique in social science research and involves each survey response being categorized, separately, by two objective researchers to one of a set of given categories. Codes were created within the themes of Type of Application, Scope of Application, Similarity, and Reaction to the Experience.

The *Type of Application* theme reflects the type, category, or classification that an application would best be defined as, particularity in the context of an app store. The eight application codes are as follows: education, security, networking, jobs, health, productivity, environment, and other.

In the first survey, as shown in Table 1, many suggestions were coded as networking, education, or productivity across both universities. The data also revealed differences. For example, students from the Canadian university did not mention environmental apps as much as the Mexican students.

In the second survey, where students ranked apps from a curated list, the frequently chosen application types were similar between the two schools (see Table 2). Interestingly, productivity apps dropped significantly in the second survey.

The *Scope of Application* theme indicates the potential reach of the apps. The different scope categories used were: local, national or global. The majority of students chose locally-based applications in the first survey. This trend continued in the second survey as well. The results of the coding of scope are shown in Figure 1.

The *Reaction to the Experience* indicates whether or not the students were surprised by their perceived similarities or differences in the interaction with the other students via videoconference. The majority of students from both schools were surprised at how similar or dissimilar their responses were compared to the students from the other school. The results of this coding and the students determination of their similarity to the students from the other university are shown in Figure 2.

Statistical Analysis

The level of similarity between the students' responses in survey two and three were quantified using both likelihood-ratio statistical significance tests (G-Tests) and chi-squared tests for independence. Specifically, H1, H2, H4, and H5 were all tested using G-Tests. For each of the tests, a significance level of α=0.05 was used. H3 was tested using chi-squared tests for independence. **Each of the hypothesis tests yielded p values less than the significance level of 0.05 and therefore resulted in a failure to reject each of the null hypotheses.**

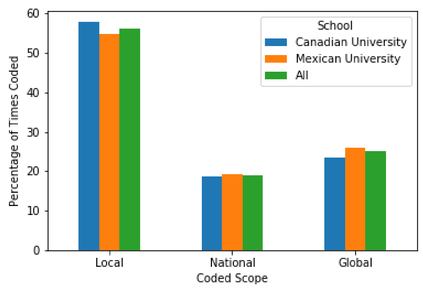

Figure 1: Survey 2 *Scope to Application*

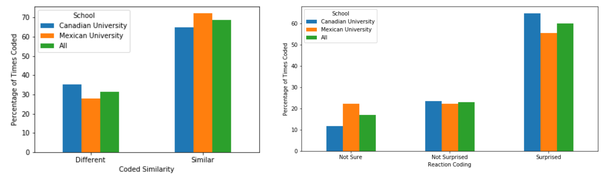

Figure 2: *Similarity to Other Students and Reaction to Experience*

Conclusion

The aim of the study was to explore and identify similarities and differences in the perception of technology as an instrument of social good between students at Canadian and Mexican Universities via an IaH initiative. While our null hypotheses were rejected, we believe it is relevant to report that there were not significant differences in the ways that students view the impact that technology on their communities. Students from strikingly different communities are concerned about similar problems, are primarily focused on their local community, and appreciate and are surprised by what they can learn about students from another part of the world.

Overall, despite their cultural difference, students of different cultures can have similar ideas about computing for social good. In the case of our study, the influences of the students' shared community of university students prevailed over those stemming from their diverse cultural backgrounds.

We believe that the outcomes of this project and the knowledge were beneficial to the students. They were introduced to the use of computing for social good and how to better understand another culture.

References

[1] M. Goldweber, J. Barr, T. Clear, R. Davoli, S. Mann, E. Patitsas, and S. Portnoff. A framework for enhancing the social good in computing education: A values approach. In *Proceedings of the Final Reports on Innovation and Technology in Computer Science education 2012 working groups,* ITiCSE-WGR '12, pages 16-38, New York, NY, USA, 2012. ACM.

[2] J. Knight. Internationalization remodeled: Definition, approaches, and rationales. *Journal of Studies in International Education,* 8(1), 5-31.

Acknowledgements

This work was supported by an Internationalization at Home grant from the Government of Alberta. We thank Professor Ken Bauer of Tec De Monterrey for involving his class in the project. Coding was performed by social scientists under the direction of Dr. J. C. Boucher of MacEwan University. We also thank Dr. Karen Buro and Austin Redmond of MacEwan University for their advice and support for the statistical analysis.