

Information and Communication Technologies for Development: ICT4D (PSCI-102-301)

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Class Hours: Friday 9-11:50

Office Hours: Tuesday 4-5 & by appt.

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1 Expectations

1.1 Overview

Information and Communication Technologies (ICTs)—the Internet, mobile phones, and all the other tools to collect, store, analyze, and share information digitally—have spread quickly. More households in developing countries own a mobile phone than have access to electricity or to clean water. In Africa, for example, the number of mobile subscribers per 100 residents was less than 2 in 2000; it is over 82 per 100 residents today. The seminar will focus on the role that ICTs innovations can play in improving development outcomes in low- and middle-income countries. The seminar would critically assess the promises and perils for utilizing ICTs in sectors such as agriculture, financial services, health, and education. In addition, the seminar will explore the role that ICTs may play in securing “better governance;” i.e., reduce corruption, improve citizen voice, government responsiveness, and political accountability writ large. Importantly, through class readings and discussions we would not only highlight the benefits of ICT4D but also some of the challenges (e.g., that ICTs may widen political participation gaps by excluding marginalized populations, they may be used to spread misinformation or that most ICT interventions ultimately fail).

Offered via Penn global, the class is unfortunately unlikely to make a trip to Uganda over spring break. Instead, I plan setting up guest lecturers that would join our class via Zoom in order to allow students to interact with and learn from expert scholars, non-government organizations, private entrepreneurs and governments agencies that are experimenting with new digital technology products and applications; hear their challenges and participate in meetings to brainstorm new ideas. The seminar is designed to be of interest to undergraduates from diverse background, such as engineering, political science, communication, sociology and business administration.

1.2 Covid-19 Adjustments

Given the current state of the pandemic, and following on the university's *Covid-19 Return to Campus Guide*, I will not be able, unfortunately, to teach this seminar in-person. Instead, the course will adopt a synchronous model: I will be holding Zoom-based lectures on Fridays 9:00-11:50a; all meetings will be recorded and posted on Canvas for students who are spending the Spring term in time zones that preclude their attendance. These are truly taxing times, and I know you were hoping for a different college experience. I am sorry that we are where we are. I will do my best to ensure a high quality course, notwithstanding the challenges Covid-19 is posing to multiple aspects of our lives.

1.3 Requirement

- **Class attendance:** 5%
 - You are expected to attend all seminar sessions. Though I naturally understand that students may miss 1-2 classes due to traveling, illness, important errands, etc., I will not pass a student who misses 4 sessions, or more.
- **Active participation and preparedness:** 10%
 - The Syllabus lists required reading that we will go over in class. You will be expected to have completed all the required readings before class to the point where you can be called on to critique or defend any reading.
- **Reading response reports:** 20% (2 × 10 points each)
 - Each student will be required to write two short reading response reports (up to 4 pages long, double-spaced) over the course of the term. These essays should engage the debates presented in at least one (but preferably more than one) of the readings for the week. The reading reports should be thought pieces and will be used to help structure class discussions.
 - Reports should summarize in an opening paragraph the core arguments and findings of the discussed paper(s) and then critique key aspects of the study (these could be the theoretical argument, empirical analysis, or any aspect of the implementation of a discussed ICT intervention). Ideally, a good response note should also identify possible extensions for future work and how the assigned readings of the week complement each other.
 - You cannot write a response on review articles. All reports must be emailed to me by Thursday at 4p, the day before our class meetings.
- **Presentation of applications / services:** 20% (2 × 10 points each)
 - Each student will be assigned to a 2-person team that will be tasked with preparing a 20 minutes presentation twice during the semester. The task involves identifying 2-3 applications, services or products that were not assigned in the week's mandatory readings, but are relevant to the week's topic. Students will be expected to explain (at minimum):
 - * what does the technology seek to solve (for example, is it faster, cheaper, has greater coverage, etc. than the status quo?)
 - * how does the technology intend to solve the a problem?
 - * how was the efficacy of the technology been tested, if at all?
 - * what do we know about the technology's efficacy (benefits and adverse effects)?
 - * what are some key reasons for the technology's success or failure?
- **Final paper (45%):** You are expected to write an original term paper of about 15-20 pages long (35% of the final grade) on one of the two topics below, and present it in class (10% of the final grade).

- **Topic 1:** Critically summarize the state of knowledge of the impact ICTs have in a domain we have not discussed extensively in class, such as, immigration, human trafficking, aid delivery, humanitarian assistance, environmental sustainability, etc. In addition to synthesizing the existing body of work, discuss shortfalls and offer promising avenues for future research. Students that choose this track will be expected to submit, in addition, an annotated bibliography of the studies they include in their review.
- **Topic 2:** Propose a new application or service that could be implemented in a developing country context. Here you will be expected to justify the need for the application (i.e., describe problems associated with the status quo), and why you expect it to have a positive effect on development writ large. In addition, you will be expected to discuss aspects of implementation that can increase the likelihood of success as well as expected challenges.
- Students will choose a day during the last 2 weeks of class to present their project (10% of the grade). They will prepare a 15-20 minutes presentation and then the class will provide them feedback and ask questions for 10 minutes. Students will be strongly encouraged to incorporate feedback in their final paper.

1.4 Grade policy

Your course grade is determined according to the following scale:

A+ (4.0): 96-100	C (2.0): 69-71
A (4.0): 91-95	C- (1.7): 66-68
A- (3.7): 86-90	D+ (1.3): 65-67
B+ (3.3): 81-85	D (1.0): 62-64
B (3.0): 78-80	D- (0.7): 60-61
B- (2.7): 75-77	F (0): below 60
C+ (2.3): 72-74	

- The grade you earn is the grade you will receive in this course. Grades are not negotiable and I do not award points on the basis of your intention to do well. The only thing that matters in determining your grade is your performance in the course.
- Every effort will be made to grade fairly and impartially; however, mistakes sometimes occur. If you have a serious reservation about how you have been graded, write a comprehensive description of the mistake as you see it. Re-grade requests will only be accepted within a week after the return of the graded work.

1.5 Attendance in times of COVID

You are expected to attend seminar meetings (via Zoom) if the synchronous session takes place between 7am and 8pm in your time zone. Exceptions to this attendance policy are:

1. If you are in a time zone outside these parameters;
2. If you are observing in a college-listed religious holiday;
3. If you are ill, or are taking care of a family member;

4. If you have exceptionally poor internet.

If any of these reasons applies to you, please contact me prior to class to let them know.

1.6 Communication

I will communicate with the class via both Slack and email. I will be setting up a Slack workspace where students can communicate more easily (with me and with each other), share papers and related newspaper articles, etc. As for email, I prefer that course related communication takes place from within Canvas. Please be certain that your UPenn email address is an email address you check on a frequent basis. Please consult the syllabus and Canvas before contacting me; the odds are good that any question about deadlines, grades, or class assignments are already answered in the syllabus, or on the course Canvas website.

1.7 Etiquette and Accommodations

You are not alone in the class, so please be considerate of your fellow students: arrive on time, take notes of what has been discussed, and do not leave early unless absolutely necessary. Turn off cell phones during lectures.

The University of Pennsylvania encourages the full participation of students with disabilities. Students with disabilities are invited to meet with me to discuss special accommodations that may be needed for successful participation in this course. Specifically, the University accommodates students with disabilities who have registered with the [Office of Student Disabilities Service](#). Students must register with the Student Disabilities Services (SDS) to be granted special accommodations for any on-going conditions. For more information on the services that you are entitled to, please refer to the following [guide](#). As for religious accommodation, the University accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled tests and examinations. However, you must notify me in the first week of class if you will require any accommodation on these grounds. For more information, please refer to the Penn's Policy on Religious Holidays.

1.8 Policy on Academic Misconduct

Academic dishonesty will not be tolerated. As outlined in the Student Handbook, "cheating" and "plagiarism" will result in severe disciplinary action on the part of the instructor. Either offense will be grounds for receiving a failing grade (zero points) on the assignment and possibly an "F" for the course, depending on the severity of the offense.

1.9 To do now

1. Follow ICT4D resources on Twitter
2. Sign up for a daily newsletter from ICTWorks (<https://www.ictworks.org/>)

2 Course material

Class readings are available electronically through the class website on Canvas.

3 Class Schedule

3.1 What do we mean by Development (1/22)

1. Sen, Amartya. (2001). *Development as Freedom*, Ch 1 (pp. 13–35).
2. Todaro, Michael P. and Stephen C. Smith “Economic Development (12th edition),” Ch 1-2.

3.2 Using ‘Big Data’ to Measuring development (1/29)

Guest Lecturer: Seth Goodman (Data Engineer, AidData)

1. Blumenstock, Joshua E., Gabriel Cadamuro, and Robert On. (2015). “Predicting poverty and wealth from mobile phone metadata.” *Science*, 350(6264): 1073-1076.
2. Donaldson, Dave, and Adam Storeygard. (2016). “The View from Above: Applications of Satellite Data in Economics.” *Journal of Economic Perspectives* 30(4): 171–198.
3. Goodman, Seth, Ariel BenYishay, Zhonghui Lv, and Daniel Runfola. (2019). “GeoQuery: Integrating HPC systems and public web-based geospatial data tools.” *Computers & Geosciences* 122: 103–112.

Suggested Readings:

- World Development Report 2021: Data for Better Lives ([concept note](#)).
- Mueller, Hannes, Andre Groger, Jonathan Hersh, Andrea Matranga, and Joan Serrat. (2020). “Monitoring War Destruction from Space: A Machine Learning Approach.”
- Yeh, Christopher, Anthony Perez, Anne Driscoll, George Azzari, Zhongyi Tang, David Lobell, Stefano Ermon, and Marshall Burke. (2020). “Using publicly available satellite imagery and deep learning to understand economic well-being in Africa.” *Nature communications* 11(1): 1–11.

3.3 Digital Divide (2/5)

Guest Lecturer: Prof. Timothy Baird (Virginia Tech)

1. Kashyap, Ridhi, Masoomali Fatehkia, Reham Al Tamime, and Ingmar Weber. (2020). “Monitoring global digital gender inequality using the online populations of Facebook and Google.” *Demographic Research* 43: 779–816.

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2. Rotondi, Valentina, Ridhi Kashyap, Luca Maria Pesando, Simone Spinelli, and Francesco C. Billari. (2020). "Leveraging mobile phones to attain sustainable development." *Proceedings of the National Academy of Sciences* 117(24): 13413–13420.
 3. Summers, Kelly H., Timothy D. Baird, Emily Woodhouse, Maria Elisa Christie, J. Terrence McCabe, Felista Terta, and Naomi Peter. (2020). "Mobile phones and women's empowerment in Maasai communities: How men shape women's social relations and access to phones." *Journal of Rural Studies* 77: 126–137.
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Suggested Readings:

- Blumenstock, Joshua Evan, and Nathan Eagle. (2012). "Divided we call: disparities in access and use of mobile phones in Rwanda." *Information Technologies & International Development* 8(2): 1–16.
- EQUALS & UN University. (2019). Taking Stock: Data and Evidence on Gender Equality in Digital Access, Skills, and Leadership.

3.4 Financial services (2/19)

Guest Lecturer: Barbara Mutabazi (Co-founder Hive colab)

1. **Review:** Suri, Tavnit. (2017). "Mobile Money." *Annual Review of Economics*, 9: 497-520.
 2. Bjorkegren, Daniel, and Darrell Grissen. (2018). "The Potential of Digital Credit to Bank the Poor." *AEA Papers and Proceedings* 108: 68-71.
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Suggested Readings:

- **Review:** Martin, Rebecca and Richard Duncombe. (2017) "Best Practice for Implementing Mobile Finance in Low-Income Communities."
- Aker, Jenny C., Rachid Boumnijel, Amanda McClelland, and Niall Tierney. (2016). "Payment mechanisms and antipoverty programs: Evidence from a mobile money cash transfer experiment in Niger." *Economic Development and Cultural Change*, 65(1): 1-37.
- Blumenstock, Joshua E., Michael Callen, Tarek Ghani, and Lucas Koepke. (2015). "Promises and pitfalls of mobile money in Afghanistan: evidence from a randomized control trial." In *Proceedings of the 7th International Conference on Information and Communication Technologies and Development*.
- Lee, Jean N., Jonathan Morduch, Saravana Ravindran, Abu Shonchoy, and Hassan Zaman. (2020). "Poverty and migration in the digital age: Experimental evidence on mobile banking in Bangladesh." *American Economic Journal: Applied Economics* .

3.5 Agriculture (2/26)

Guest Lecturer: Prof. Ernest Mwezembe (Makerere University)

1. Mutembesa, Daniel, Christopher Omongo, and Ernest Mwebaze. (2018). "Crowdsourcing Real-Time Viral Disease and Pest Information: A Case of Nation-Wide Cassava Disease Surveillance in a Developing Country." In *HCOMP*.
2. **Review:** Deichmann, Uwe, Aparajita Goyal, and Deepak Mishra. (2016). "Will digital technologies transform agriculture in developing countries?" *Agricultural Economics* 47: 21-33.
3. **Review:** Aker, Jenny C., Ishita Ghosh, and Jenna Burrell. (2016). "The promise (and pitfalls) of ICT for agriculture initiatives." *Agricultural Economics*, 47(S1): 35-48.

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- Nakasone, Eduardo, Maximo Torero, and Bart Minte. (2014). "The Power of Information: The ICT Revolution in Agricultural Development. *Annual Review of Resource Economic* 6(1): 533-550.
 - Courtois, Pierre, and Julie Subervie. (2014). "Farmer bargaining power and market information services." *American Journal of Agricultural Economics*, 97(3): 953-977.
 - Cole, Sean. A., & Fernando, A. (2016). "Mobile-izing Agricultural Advice: Technology Adoption, Diffusion and Sustainability."
 - Sekabira, Haruna, and Matin Qaim. (2017). "Mobile money, agricultural marketing, and off-farm income in Uganda." *Agricultural Economics*, 48(5): 597-611.

3.6 Health (3/5)

Guest Lecturer: Prof. Vivek N.D (AURO University, Surat)

1. Olu, Olushayo Oluseun, Derrick Muneene, Juliet Evelyn Bataringaya, Marie-Rosette Nahimana, Housseynou Ba, Yves Turgeon, Humphrey Cyprian Karamagi, and Delanyo Dovlo. (2019). "How can digital health contribute to sustainable attainment of universal health coverage in Africa? A Perspective." *Frontiers in Public Health* 7: 341.
2. Haenssger, Marco J., and Ariana Proochista . (2017). "The social implications of technology diffusion: Uncovering the unintended consequences of people's health-related mobile phone use in rural India and China." *World Development* 94: 286-304.
3. Comments by Jan Swasthya Abhiyan on the Health Data Management Policy (HDMP) under the National Digital Health Mission (NDHM).

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- **Review:** Aranda-Jan, C. B., Mohutsiwa-Dibe, N., & Loukanova, S. (2014). "Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa." *BMC public health*, 14(1): 188.

- Willcox, Jane C., Rosie Dobson, and Robyn Whittaker. (2019). "Old-Fashioned Technology in the Era of 'Bling': Is There a Future for Text Messaging in Health Care?" *Journal of Medical Internet Research* 21(12): e16630.
- **Review:** Hrynick, T., & Waldman, L. (2017). "ICT-facilitated accountability and engagement in health systems: a review of Making All Voices Count mHealth for accountability projects."
- **Systematic report:** Brown, A. N. & Skelly, H. J. (2018). "How much evidence is there really? Mapping the evidence base for ICT4D interventions."
- Chib, A., van Velthoven, M. H., & Car, J. (2015). mHealth adoption in low-resource environments: a review of the use of mobile healthcare in developing countries. *Journal of health communication*, 20(1): 4-34.
- <https://www.ictworks.org/top-4-ways-icts-can-help-defeat-the-ebola-crisis/>

3.7 Education (3/12)

Guest Lecturer: Morrison Rwakakamba (CEO, The Agency for Transformation)

1. Tessitore, Matthew. (2019). "Bridge International Academies: A critical analysis of the privatization of public education in Africa." *Review of Education, Pedagogy, and Cultural Studies* 41(3): 193–209.
2. **Review:** Escueta, Maya, Andre Joshua Nickow, Philip Oreopoulos, and Vincent Quan. (2020). "Upgrading Education with Technology: Insights from Experimental Research." *Journal of Economic Literature* 58(4): 897–996.
3. <https://www.theverge.com/2018/4/16/17233946/olpcs-100-laptop-education-where-is-it-now>

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- Piper, Benjamin, Stephanie Simmons Zuilkowski, Dunston Kwayumba, and Carmen Strigel. (2016). "Does technology improve reading outcomes? Comparing the effectiveness and cost-effectiveness of ICT interventions for early grade reading in Kenya." *International Journal of Educational Development* 49: 204-214.
 - **Review:** Tauson, M., & Stannard, L. (2018). EDTECH for learning in emergencies and displaced settings.
 - **Report:** World Bank (2018). *World Development Report: Learning to Realize Education's Promise*, especially chapter 7.
 - **Newspaper article:** "In poor countries technology can make big improvements to education." *The Economist*, November 17, 2018.
 - Bulman, George, and Robert W. Fairlie. (2016). "Technology and education: Computers, software, and the internet." In *Handbook of the Economics of Education* (Vol. 5, pp. 239-280).
 - Kho, Kevin, Leah Lakdawala, and Eduardo Nakasone. (2020). "Dynamic Impacts of School-based Internet Access on Student Learning."

3.8 Digital ID (3/19)

Guest Lecturer: Anna Metz (Program Officer, Identification for Development, The World Bank)

1. Muralidharan, Karthik, Paul Niehaus, and Sandip Sukhtankar. (2016). "Building State Capacity: Evidence from Biometric Smartcards in India." *American Economic Review*, 106(10): 2895-2929.
2. Gelb, Alan, and Anna Diofasi Metz. (2017) "Identification Revolution: Can Digital ID be Harnessed for Development?" *CGD Brief* October 2017.

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- Bussell, Jennifer L. (2010). "Why Get Technical? Corruption and the Politics of Public Service Reform in the Indian States." *Comparative Political Studies*, 43(10): 1230-1257.

3.9 Elections (3/26)

Guest Lecturer: Prof. Danielle Jung (Emory)

1. Gelb, Alan, and Anna Diofasi. (2019). "Biometric elections in poor countries: wasteful or a worthwhile investment?." *Review of Policy Research* 36(3): 318–340.
2. Callen, Michael, Clark C. Gibson, Danielle F. Jung, and James D. Long. (2016). "Improving electoral integrity with information and communications technology." *Journal of Experimental Political Science* 3(1): 4–17.
3. Erlich, Aaron, Danielle F. Jung, James D. Long, and Craig McIntosh. (2018). "The double-edged sword of mobilizing citizens via mobile phone in developing countries." *Development Engineering*, 3: 34-46. 185–200.

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- Aker, Jenny C., Paul Collier and Pedro C. Vicente. (2017). "Is information power? Using mobile phones and free newspapers during an election in Mozambique." *Review of Economics and Statistics* 99(2):
 - Bailard, Catie Snow. (2012). A field experiment on the internet's effect in an African election: savvier citizens, disaffected voters, or both?. *Journal of Communication*, 62(2): 330-344.
 - Reuter, Ora John, and David Szakonyi, D (2015). "Online Social Media and Political Awareness in Authoritarian Regimes." *British Journal of Political Science*, 45(1): 29-51.
 - Kassen, Maxat. (2020). "Politicization of e-voting rejection: reflections from Kazakhstan." *Transforming Government: People, Process and Policy*

3.10 Political Participation, Mobilization and Disinformation (4/2)

Guest Lecturer: Badrinathan, Sumitra (Penn and Oxford) and Wouter Dijkstra (TRAC FM)

1. Grossman, Guy, Macartan Humphreys and Gabriella Sacramone-Lutz. (2014). "I wld like u WMP to extend electricity 2 our village": On Information Technology and Interest Articulation. *American Political Science Review*, 108(3): 688-705.
2. Badrinathan, Sumitra (2020). "Educative Interventions to Combat Misinformation: Evidence From A Field Experiment in India." *American Political Science Review*

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- Blair, Graeme, Rebecca Littman, and Elizabeth Levy Paluck. (2019). "Motivating the adoption of new community-minded behaviors: An empirical test in Nigeria." *Science advances* 5(3): eaau5175.
 - Van der Windt, Peter and Macartan Humphreys. (2016). "Crowdseeding in Eastern Congo: Using cell phones to collect conflict events data in real time." *Journal of Conflict Resolution*, 60(4): 748-781.

3.11 Service delivery (4/9)

Guest Lecturer: Prof. Arman Rezaee (UC Davis)

1. Hasanain, Ali, Muhammad Yasir Khan, and Arman Rezaee. (2019). "No bulls: Experimental evidence on the impact of veterinarian ratings in Pakistan."
2. Callen, Michael, Saad Gulzar, Ali Hasanain, Muhammad Yasir Khan, and Arman Rezaee. (2020). "Data and policy decisions: Experimental evidence from Pakistan." *Journal of Development Economics* 146:
3. Grossman, Guy, Melina Platas and Jonathan Rodden, (2018). "Crowdsourcing accountability: ICT for service delivery." *World Development*, 112: 74-87.

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- Buntaine, Mark T., Patrick Hunnicutt, and Polycarp Komakech. (2020). "The challenges of using citizen reporting to improve public services: A field experiment on solid waste services in Uganda." *Journal of Public Administration Research and Theory*.
 - Blanco, Mariana, and Juan F. Vargas. (2014). "Can SMS technology improve low take-up of social benefits?" *Peace Economics, Peace Science and Public Policy*, 20(1): 61-81.
 - Dhaliwal, Iqbal, & Hanna, Rema. (2017). "The devil is in the details: The successes and limitations of bureaucratic reform in India." *Journal of Development Economics*, 124: 1-21.
 - **Report:** McGee, Rosemary, Duncan Edwards, Hannah Hudson, Colin Anderson, and Francesca Feruglio. (2018). "Appropriating technology for accountability: messages from Making All Voices Count."

3.12 Conflict, Protest, Intolerance (4/16)

Guest Lecturer: Prof. Alexandra Siegel (University of Colorado at Boulder)

1. Shapiro, Jacob N. and Nils B. Weidmann. (2015). "Is the Phone Mightier Than the Sword? Cellphones and Insurgent Violence in Iraq." *International Organization*, 69(2): 247-274.
2. Siegel, Alexandra, Yael Zeira and Deen Freelon. (2020). "The Ethnicization of Syria's Conflict: A Social Media Analysis."
3. Esberg, Jane and Alexandra Siegel. (2020). "How Exile Shapes Online Opposition: Evidence from Venezuela."

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- **Review:** Zeitzoff, Thomas. (2017). "How Social Media is Changing Conflict." *Journal of Conflict Resolution*, 61(9): 1970-1991.
 - **Review:** Dafoe, Allan and Jason Lyall. (2015). "From cell phones to conflict? Reflections on the emerging ICT-political conflict research agenda." *Journal of Peace Research*, 52(3): 401-413.
 - Christensen, Darin Francisco Garfias. (2018). "Can You Hear Me Now? How Communication Technology Affects Protest and Repression." *Quarterly Journal of Political Science*, 13(1): 89-117.
 - Steinert-Threlkeld, Zachary C. (2017). "Spontaneous Collective Action: Peripheral Mobilization During the Arab Spring." *American Political Science Review*, 111(2): 379-403.
 - Siegel, Alexandra, Joshua A. Tucker, Jonathan Nagler, and Richard Bonneau. (2020). "Tweeting beyond Tahrir: Ideological Diversity and Political Tolerance in Egyptian Twitter Networks"

3.13 Students' presentations (4/23)

3.14 Students' presentations (4/30)