DRAFT
Teachers College
Columbia University
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HUDK4035 – Technology and Human Development

Gary Natriello
gary.natriello@gmail.com or gjn6@tc.columbia.edu

Hui Soo Chae
chae@learninginnovationadvisors.com

Course Overview

In this course instructors and students will use the project method to explore the role of technology in human development at multiple times and scales. The course is organized around a set of projects. Themes and resources are provided for each project, but students are encouraged to go beyond those provided to explore widely. For each project the readings and resources will explore the history, impact, and current examples of technologies intended to augment human capacities and development. Students completing the course should appreciate a broader theoretical perspective on technology as it relates to human development as the foundation for more creative and innovative thinking about the continuing evolution of technology.

Learning Objective

Students completing the course will have a more complex and nuanced understanding of technology, human development and the ways they have interacted over time.

Course Requirements

Assigned Readings

There are assigned common or shared readings throughout the semester. These are essential for providing perspectives and background for all of our work in the course All readings and resources will be provided by the instructor. Readings are distributed on the syllabus across the weeks of the semester, but students should plan their reading to meet the needs of the projects.

Team Design Projects (40%)

Students will be organized in small teams to work on the four design projects. Teams will draw on the principles developed in the readings or discussed in class sessions to work on the projects. In addition to a final team deliverable for each project, students will be responsible for posting in the team discussion on their work weekly. Each of the four team projects will be worth 10%.

Projects will be evaluated on: a) responsiveness to the assignment, b) use of readings and resources, and c) originality.

Individual Self-Directed Learning Reflections (30%)

Students will be expected to write reflections on their learning in each project in the course. Reflections will be submitted at the end of each project on the project page. Reflections will be evaluated on: a) analytical treatment of course materials, b) inclusion of additional materials identified through independent research, c) thoughtfulness of observations of teamwork, and d) overall statement on what was learned.

Team Participation (15%)

Attentive and active engagement in team activities and weekly postings on your role in the team discussion thread.

Class Participation Thread (15%)

Attentive and active engagement in class sessions and weekly postings in the class discussion thread.

Project 1 – Defining Technology/Defining Human Development

In this project we will consider various approaches to defining technology and various conceptions of human development. This initial thinking will provide a foundation for the other three projects of the course.

Week 1 – Introductions - Monday, January 27th

Resource Group 1 – The Course

Introduction to the Course and Syllabus
Introductions of the Members of the Class

Week 2 – Work Arrangements – The Project Method - Monday, February 3rd
Last day to Add Courses for Spring Semester

Resource Group 2 – The Project Method

Baron, B., Schwartz, D., Vye, N., Moore, A., Petrosino, A., Zech, L, & Bransford, J. (1998). Doing with Understanding: Lessons from Problem- and Project-Based Learning. *Journal of the Learning Sciences, 7*(3&4), 271-311.

Krajcik, J. & Shin, N. (2022). Project-Based Learning. Chapter 4 (pp. 72-92). In R. Keith Sawyer, (ed.). *The Cambridge Handbook of the Learning Sciences* (3rd edition). New York: Cambridge University Press.

LeChasseur, K. (2020). *Project-Based Learning in Graduate Education*. PDL Brief #4. Worcester Polytechnic University: Center for Project Based Learning.

Week 3 – Technology - Monday, February 10th

Resource Group 3 – Defining Technology

Li-Hua, R. (2018). Definitions of Technology. Pp. 18-22 in J. Olsen, S. Pedersen, & F, Hendricks (eds.). *A Companion to the Philosophy of Technology* Malden, MA: Blackwell Publishing Ltd.

Schatzberg, E. (2018). *Technology: Critical History of a Concept*. Chicago: University of Chicago Press. Chapter 1 (pp. 1-15), Chapter 13 (pp. 214-234), Manifesto (pp. 235-236.

Borgmann, A. (2006). Technology as a cultural force: For Alena and Griffin. *The Canadian Journal of Sociology, 31(*3), 351-360

Week 4 – Human Development - Monday, February 17th

Resource Group 4 – Defining Human Development

Oosterlaken, I. (2015). *Technology and Human Development*. London: Routledge. Introduction, pp. 1-18, Chapter 1, pp. 19-45, Chapter 2, pp. 46-77.

Human Development 2020 Report of the UN (2020). *The Next Frontier: Human Development in the Anthropocene*. New York: United Nations Development Program.

Coeckelbergh, M. (2011). Human development or human enhancement? A methodological reflection on capabilities and the evaluation of information technologies. *Ethics and Information Technology, 13*, 81-92.

Project 2 – Basic Perspectives on Technology and Human Development

For this project we will examine and apply basic conceptions of technology and human development. The refers to phenomena that have broad impact across human populations and include units such as nation states, cultures, civilizations, societies, or global phenomena. We will highlight three areas where technologies have interacted with human development: time, space, human life.

Week 5 – Monday, February 24th

Resource Group 5 - Time

Zerubavel, E. (2020). The sociology of time. In J. Reinecke, R. Suddaby, A. Langley, & H. Tsouka (eds.). *Time, Temporality, and History in Process Organization Studies*. (pp. 44-49). New York: Oxford University Press.

Zerubavel, E. (1979). Private time and public time: The temporal structure of social accessibility and professional commitments. *Social Forces , 58*(1), 38-58

Cooperrider, K. & Nunez, R. (2016, November). How we make sense of time. *Scientific American - SA Mind, 78(6)*, pp. 38-43.

Wajcman, J. (2019). The Digital Architecture of Time Management. *Science, Technology, & Human Values*, *44*(2), 315–337.

Rovelli, C. (2018). The Scent of the Madeleine Chapter 13 (pp. 171-192). *The Order of Time*. New York: Riverhead Books.

Week 6 – Monday, March 3rd

Resource Group 6 - Space – Mapping and Moving

Sullivan, D., Keefer, L., Steward, S., & Palitsky, R. (2016). Time-Space Distanciation: An Interdisciplinary Account of How Culture Shapes the Implicit and Explicit Psychology of Time and Space. *Journal for the Theory of Social Behaviour, 46,* 4, 450-474.

Ceruzzi, P. (2018). GPS. Cambridge, MA: MIT Press. Chapter 4 – The Birth of GPS, pp. 73-103.

Dobbs, D. (2016, November-December). Wazed and confused: are GPS apps messing with our brains? *Mother Jones*, *41*(6), 53+.

Ruginski, I., Creem-Regehr, S., Stefanucci, J. & Cashdan, E. (2019). GPS use negatively affects environmental learning through spatial transformation abilities. *Journal of Environmental Psychology 64,* 12–20.

Week 7 – Monday, March 10th

Resource Group 7 – Human Life

Roman, F. (1993). The invention of spectacles. *British Journal of Opthalmology, 77*(9), 568.

The Invention of Spectacles. (2001). In N. Schlager & J. Lauer (Eds.), *Science and Its Times* (Vol. 3). Gale.

Metzl, J. (2019). *Hacking Darwin: Genetic engineering and the future of humanity*. Naperville, IL: Sourcebooks, Inc. Chapter 1 – Where Darwin Meets Mendel, pp. 1-30.

Davies, K. (2020). The CRISPR Craze. Chapter 1 (pp. 10-16) in Editing Humanity: The CRISPR Revolution and the New Era of Genome Editing. New York: Pegasus.

Davies, K. (2020). A Cut Above. Chapter 2 (pp. 17-24) in *Editing Humanity: The CRISPR Revolution and the New Era of Genome Editing*. New York: Pegasus.

Stevens, H. (2013). Introduction. (pp. 1-10). *Life out of sequence: A data-driven history of bioinformatics*. Chicago: University of Chicago Press.

Stevens, H. (2013). Conclusion (pp. 1-18). *Life out of sequence: A data-driven history of bioinformatics*. Chicago: University of Chicago Press.

SPRING BREAK

Project 3 – Collaborative Perspectives on Technology

In this project we will consider technologies related to collaboration. These technologies often function to join processes or experiences at the individual level to broader phenomenon or to facilitate the connection of individuals into social units or configurations. Here we will consider three areas: communications, physical labor, and exchange. In each of these areas there are long histories that are continued and extended by contemporary work with the promise of progress.

Week 8 – Monday, March 24th

Resource Group 8 – Communications

Harari, Y, (2024). Documents: The Bite of the Paper Tigers. Chapter 3, pp. 40-69 in *Nexus: A Brief History of Information Networks from the Stone Age to AI.* New York: Random House.

O'Donnell, J. (1998). Chapter 3 – From the CODEX Page to the Home Page and Hyperlink: The Shrine of Nonlinear Reading. In *Avatars of the Word: From Papyrus to Cyberspace. (pp. 50-70).* Cambridge, Mass.: Harvard University Press.

Bowker, L. & Clro, J. (2019). Chapter 2 – Machine translation. Pp. 37-54 in Machine Translation and Global Research: Towards Improved Machine Translation Literacy in the Scholarly Community. UK: Emerald Publishing Limited.

Poibeau, T. (2017). *Machine Translation*. Cambridge, MA: MIT Press. Ch 1 – Introduction, pp. 1-6, Ch 2 – The Trouble with Translation, pp. 7-24, Ch 3 – A Quick Overview of the History of Machine Translation, pp. 25-37.

Underwood, M. K., & Ehrenreich, S. E. (2017). The power and the pain of adolescents' digital communication: Cyber victimization and the perils of lurking. *American Psychologist, 72*(2), 144-158.

Week 9 – Monday, March 31st

Resource Group 9 – Physical Labor

Kitsikopoulos, H. (2013). From hero to newcomer: The critical scientific and technological developments that led to the invention of the steam engine. *Proceedings of the American Philosophical Society, 157*(3), 304-344.

Mokyr, J. (2001). The rise and fall of the factory system: technology, firms, and households since the industrial revolution. *Carnegie-RochesterConference Series on Public Policy 55*, l-45.

Watson, D. (2019). Fordism: A review essay. *Labor History, 60*(2), 144-159.

Veruggio G., Operto F., & Bekey G. (2016). Chapter 80 - Roboethics: Social and Ethical Implications. In: Siciliano B., Khatib O. (eds) *Springer Handbook of Robotics* (pp. 2135-2160). Springer Handbooks. Springer, Cham.

Samani, H., Saadatian, E., Pang, N., Polydorou, D., Fernando, O., Nakatsu, R., & Koh, J. (2013). Cultural Robotics: The Culture of Robotics and Robotics in Culture. *International Journal of Advanced Robotic Systems*, 10(12), 400.

Nyholm, S. (2018). The ethics of crashes with self-driving cars, I. *Philosophy Compass, 13*(7). e12507

Nyholm, S. (2018). The ethics of crashes with self-driving cars, II. *Philosophy Compass, 13*(7). e12506

Stilgoe, J. (2018**).** Machine learning, social learning and the governance of self-driving cars. *Social Studies of Science, 48*(1) 25–56.

Week 10 – Monday, April 7th

Resource Group 10 – Exchange

Kuroda, A. (2020). Introduction in *Global History of Money* (pp. 1-16). London: Routledge.

Kuroda, A. (2020). The ignition of the delocalization of money in *Global History of Money* (pp. 67-115). London: Routledge.

Brown, G. (2020). Chapter 1 – Now I know my ABCs: Algorithms, Blockchain, and Cryptocurrency (pp. 9-34) In *Algorithms, Blockchain & Cryptocurrency: Implications for the Future of the Workplace.* UK: Emerald.

Tapscott, D. & Tapscott, A. (2017). How blockchain technology will change organizations. *MIT Sloan Management Review, 58*(2), 10-13.

Lumineau, F., Wang, W. and Schilke, O. (2021). Blockchain governance. *Organization Science, 32*(2), 500–521

Chang, Y., Iakovou, E. & Shi, W. (2020) Blockchain in global supply chains and cross border trade: a critical synthesis of the state-of-the-art, challenges and opportunities, International *Journal of Production Research, 58*:7, 2082-2099.

Project 4 – Enhancement Perspectives on Technology

This project will consider enhancement perspectives on technology and human development, particularly in regard to mental work. We will examine four areas where technologies have been developed to augment human mental capacity: physical devices, computers/digital devices, artificial intelligence, and autonomous agents.

Week 11 – Monday, April 14th

Resource Group 11 – Pre-Digital Devices to Support Mental Labor

Sugden, K. (1981). A history of the abacus. *The Accounting Historians Journal, 8*(2), 1-22 .

Tympas, A. (2917). The delights of the slide rule. Pp. 7-38 in *Calculation and Computation in the Pre-electronic Era The Mechanical and Electrical Ages*. London: Springer-Verlag.

Rao, C. (2019). A brief history of the periodic table. *Current science, 117*(12), p. 1963-1966.

Dictaphone – *Wikipedia Entry*

Mechanical Calculator – *Wikipedia Entry*

Week 12 – Monday, April 21st

Resource Group 12 – Computers

Watson, I. (2012). Chapter 1 – Introduction, Chapter 2 – The Dawn of Computing, Chapter 3 – Marvelous Machines in *The Universal Machine* (pp. 1-49). Berlin Heidelberg: Springer-Verlag.

Harari, Y. (2024). The New Members: How Computers are Different from Printing Presses. Chapter 6 (pp. 193-229) in *Nexus: A Brief History of Information Networks from the Stone Age to AI.* New York: Random House.

Whittaker, M. (2023. Origin Stories: Plantations, Computers, and Industrial Control. *Logic(s),* Issue 19.

Week 13 – Monday, April 28th

Resource Group 13 - Artificial Intelligence

Cheng, L., Varshney, K., & Liu H. (2021). Socially Responsible AI Algorithms: Issues, Purposes, and Challenges. *Journal of Artificial Intelligence Research 71*, 1137-1181.

Narayanan, A. & Kapor, S. (2024). The Long Road to Generative AI. Chapter 4 (pp. 99-149) in *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton: Princeton University Press.

Narayanan, A. & Kapor, S. (2024). Is Advanced AI An Existential Threat?. Chapter 5 (pp. 150-178) in *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton: Princeton University Press.

Michael L. Littman, et al. (2021). *Gathering Strength, Gathering Storms: The One Hundred Year Study on Artificial Intelligence (AI100) 2021 Study Panel Report.* Stanford University, Stanford, CA, September. https://ai100.stanford.edu/

Week 14 – Monday, May 5th

Resource Group 14 – Predictive AI

Narayanan, A. & Kapor, S. (2024). How Predictive AI Goes Wrong. Chapter 2 (pp. 36-59) in *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton: Princeton University Press.

Narayanan, A. & Kapor, S. (2024). Can't AI Predict the Future?. Chapter 3 (pp. 60-98) in *AI Snake Oil: What Artificial Intelligence Can Do, What It Can't, and How to Tell the Difference*. Princeton: Princeton University Press.

Week 15 – Monday, May 12th

Final Meeting

The Provost and Dean of the College in conjunction with the Faculty has adopted the following statements to be included on all Teachers College syllabi.

1. **Accommodations** – The College will make reasonable accommodations for persons with documented disabilities. Students are encouraged to contact the Office of Access and Services for Individuals with Disabilities (OASID) for information about registration. You can reach OASID by email at oasid@tc.columbia.edu, stop by 301 Zankel Building or call 212-678-3689. Services are available only to students who have registered and submit appropriate documentation. As your instructor, I am happy to discuss specific needs with you as well. Please report any access related concerns about instructional material to OASID and to me as your instructor.
2. **Incomplete Grades** – For the full text of the Incomplete Grade policy please refer to http://www.tc.columbia.edu/policylibrary/Incomplete Grades
3. **Student Responsibility for Monitoring TC email account** – Students are expected to monitor their TC email accounts. For the full text of the Student Responsibility for Monitoring TC email account please refer to http://www.tc.columbia.edu/policylibrary/Student Responsibility for Monitoring TC Email Account
4. **Religious Observance** – For the full text of the Religious Observance policy, please refer to http://www.tc.columbia.edu/policylibrary/provost/religious-observance/
5. **Sexual Harassment and Violence Reporting** – Teachers College is committed to maintaining a safe environment for students. Because of this commitment and because of federal and state regulations, we must advise you that if you tell any of your instructors about sexual harassment or gender-based misconduct involving a member of the campus community, your instructor is required to report this information to the Title IX Coordinator, Janice Robinson. She will treat this information as private, but will need to follow up with you and possibly look into the matter. The Ombuds Officer is a confidential resource available for students, staff and faculty, including matters concerning "Gender-based Misconduct". "Gender-based misconduct" includes sexual assault, stalking, sexual harassment, dating violence, domestic violence, sexual exploitation, and gender-based harassment. For more information, see http://sexualrespect.columbia.edu/gender-based-misconduct-policy-students. The TC Ombuds Officer may be reached at ombuds@tc.columbia.edu or 212-678-4169.
6. **Emergency Plan** – TC is prepared for a wide range of emergencies. After declaring an emergency situation, the President/Provost will provide the community with critical information on procedures and available assistance. If travel to campus is not feasible, instructors will facilitate academic continuity through Canvas and other technologies, if possible.

    1. It is the student's responsibility to ensure that they are set to receive email notifications from TC and communications from their instructor at their TC email address.
    2. Within the first two sessions for the course, students are expected to review and be prepared to follow the instructions stated in the emergency plan.
    3. The plan may consist of downloading or obtaining all available readings for the course or the instructor may provide other instructions.