

# The Automation of Work and Work of Automation

## Learning Module

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The future of work is uncertain. Students need knowledge and tools that help them navigate and influence their future. Most writing in the public sphere about automation focuses on fears of job loss, but previous research on automation suggests that the effects of automation are more complicated. Students should be less concerned about job loss and more concerned about how to navigate a changing future of work.

This learning module gives educators resources to help familiarize students with advances in technology and changes in organizing that may affect the future work. The goal of the module is to empower students to have more effective deliberations about the future of work and to think critically now about what the future of their work should be. As teachers, we hope this module will help students realize and use the agency they have in shaping the future of work.

## Learning Objectives

After successfully completing this module, students should be able to:

- Describe the effects of automation on the future of work and communication at work
- Explain how “augmented intelligence” may enhance or degrade human capabilities including communication
- Identify the critical communication skills necessary for an automated workplace
- Interpret the intersection of automation with other academic fields and disciplines and relevant debates about the future of work



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# Assignment and Activity Ideas

## Building this Module into Your Course

We designed the module as a three or four hour insert into an existing course. We anticipated that instructors would spend 1-2 weeks of their course with these materials. At the same time, we wanted to provide enough materials so they could serve as the beginning of an entire course dedicated to questions about the future of work and automation in particular. The module includes recommended readings and additional resources that may be useful for instructors as well as a set of slides that comprise two hours of classroom instruction. The module also provides a range of assignment ideas, case studies, and exam questions. We also designed the module to lend itself to adoption in online, face-to-face, or hybrid teaching modalities.

## How We Worked with the Modules in Our Teaching

We have used the core course elements in our own classes. Dr. Davis will use them in Business and Professional Communication (SPCH 1321) at Austin Community College. This course is focused on the study and application of communication within a business and professional context. Dr. Barbour used them in a course focused on the communication involved in health and healthcare work at the University of Texas at Austin (CMS 330P: Communicating with Patients). The Expanding Pathways in Computing (EPIC) unit of the Texas Advanced Computing Center evaluated the implementations of the modules in these courses. We made changes in the module based on their evaluations, and we have also included their evaluations as a valuable resource for future course planning.

## Module Contents

- **Slides** with notes that comprise between 50-100 minutes of class time. The slide includes four sections: An introduction, a discussion of prevailing beliefs about automation, theoretical frameworks, communication skills. The sections do build on each other, but they are independent. This flexible design should allow instructors to reorder the content as they see fit. The slides are available at <https://www.apronlab.org/the-future-of-work>.
- **The Career Profile Assignment:** The core assignment we recommend with this module is a career profile where students conduct their own research about the future of work in a specific occupation of their choice. This assignment be scaled to encompass an entire semester completed by individual individual students or teams of student or a quick, in-class research exercise. As an in-class exercise, small groups of students could be tasked with conducting quick research about a in which career they share interest that they then share with the class. The module includes a larger, semester-long assignment description and examples completed by students, available at <https://www.apronlab.org/the-future-of-work>.
- **Assignment and Activity Ideas:** In the following pages, the module also lists additional ideas for assignments and activities that may be useful.
- **Digital Content:** We provide links to examples that may useful in teaching this material.
- **Relevant Readings and References:** This document also lists additional resources that may be helpful in teaching this material.

## Watch and Discuss David Autor's Talk

Students watch a TED Talk by David Autor and then completed a discussion online. This assignment could also be adapted to in-person instruction by having them watch the video, reflect in writing, and then talk in small groups. Dr. Autor discusses the o-ring principle and the never-get-enough principle to describe what past automation has contributed to the proliferation of new forms of work. Most of the work we do requires multiple skills. Automating some of them makes the others more not less important. Adding value through automation to one skill raises the value of all the other skills involved. The o-ring was so important because everything else involved was so reliable. ATMs made the work of the tellers more important because it focused their time on higher value tasks. As automation shrinks the work in others, new industries have emerged that demand labor. An assignment description for students follows.

Watch Dr. David Autor's talk about automation.

[https://www.ted.com/talks/david\\_autor\\_will\\_automation\\_take\\_away\\_all\\_our\\_jobs/](https://www.ted.com/talks/david_autor_will_automation_take_away_all_our_jobs/)

If you want to learn more about the arguments in this video, check out Dr. Autor's article: Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. *The Journal of Economic Perspectives*, 29(3), 3–30.

### Questions to Answer while you Watch

- What is the shorthand for the two principles of economics discussed by Dr. Autor? What do they mean?
- How does the example of the o-ring in the Challenger Disaster illustrate the importance of human skill in work?
- What is employment polarization?
- How did policy makers in the farming states respond to the automation of farming work?

### Question for Discussion

- Dr. Autor argued the key question is not whether or not there will be work. The key question is, how will we use the bounty of time created by automation? What would you want work to look like in the future?

## Test and Discuss an Automated Health Information Tool

This assignment asks students to test out the Babylon Health application, an automated health information and diagnosis tool. The assignment is designed to be completed in an online discussion, but it could be adapted to an in-person classroom setting by having them test the application, reflect in writing, and then talk in small groups. An assignment description for students follows.

### **Are robots coming for your job? A discussion**

(Share an image from Babylon Caregiving Flow - <https://www.babylonhealth.com/us>)

#### *AW/WA - Are robots coming for your job? Post*

First, download and create an account with the Babylon Health App <https://www.babylonhealth.com/us/download-app>. If you don't have a device that will run this application, schedule an appointment with the teaching team to try this out together. Feel free to create a "throwaway account." You don't need to give the application an accurate birthdate, for example, but pick one within a year or so.

Babylon Health is a company based in the United Kingdom that focuses on AI-supported telehealth. They have an office right here in Austin, TX. You can read more about these technologies here: <https://www.babylonhealth.com/us/ai>.

Second, pretend that you have a set of symptoms—whatever you like. Then use the free symptom check functionality. If you have time, you can also try the Healthcheck feature.

Third, write a short post that addresses these questions that applies arguments from the readings to this example:

1. Do you think an AI-driven application like this one could replace caregiving? Why or why not?
2. How might you use an application like this in your caregiving practice with patients? That is, how might it augment your practice?

Once you've shared your post in our discussion platform, wait until a few of your colleagues have posted, and then it's on to the discussion.

#### *Are robots coming for your job? Discuss*

Now that you have seen others' posts, as a group tackle these questions:

1. How might a technology like this might affect how providers communicate with patients?
2. How might it improve or degrade their interaction and health outcomes?
3. As a patient, how would you need to change your communication to adapt to it?
4. As a provider, how would you need to change your communication to adapt to it?

As a group, come to consensus about whether or not your group believes that AI will be net benefit or drain on caregiving and what you should do as caregivers to get the most from it. Aim for a robust discussion that builds toward a conclusion that the group can endorse rather than a certain number of posts.

You will be done once the group has its concluding statement. Post it online, everyone indicate their agreement with it via a reply.

## The Permission to Walk Case Study

Students read Kramer's (2010) case study, *Permission to Walk*, and reflect on how automation might figure into addressing the issues raised in the case. This case provides students with the opportunity to explore the frustrations of Dennis, an employee working at the headquarters for an international corporation as he attempts to plan a simple company event. Encountering a partially automated approval system, Dennis experiences difficulty in gaining the appropriate permissions for the event. The case provides students with insight into Dennis's thoughts as well as his communication with members from multiple levels of the organization. Students can consider how automation may or may not improve the process while also examining how communication patterns and job roles within the organization might be affected.

Kramer, M.W. (2010). *Permission to walk*. In J. Keyton & P. Shockley-Zalabak (Eds.), *Case studies in organizational communication: Understanding communication processes*, (3rd ed., pp. 132-140). New York: Oxford University.

### Questions for Discussion

- Which part(s) of the process of requesting to use the Quad could be further automated to avoid the issues Dennis experienced?
- Describe the job roles that might be affected, either positively or negatively, by automation of UCETC events.
- What impact would automating processes have on the ability for employees to plan and obtain approval for events at UCETC?

## **Inequity and Automation Discussion**

A key insight of work on automation is that its effects are complex. Automation has different implications for organizations and workers depending on the nature of their work and policy decisions. This discussion invites students to read about the differential effects of automation and what policies they would put in place to mitigate the inequity in the effects. To foster this discussion, we recommend the following readings.

Cook, K., Pinder, D., Stewart, S., Uchegbu, A., & Wright, J. (2019). *The future of work in black America*. McKinsey & Company. <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-in-black-america>

Casey, M., & Smith, E. (2020). *Automation from farm to table: Technology's impact on the food industry*. Brookings. <https://www.brookings.edu/blog/up-front/2020/11/23/automation-from-farm-to-table-technologys-impact-on-the-food-industry/>

## Digital Content

Here are links to additional examples that may be useful in teaching this material.

- Mashable, a video of an automated pizza-making robot <https://mobile.twitter.com/mashable/status/1405099580996427780>
- Cal Newport's blog, a story of new technology at work, <https://www.calnewport.com/blog/2021/06/22/on-the-dynamo-and-email/>
- This American Life radio show, the story of a new, automated factory that failed to reproduce the organization's signature product, *Call in Colonel Mustard For Questioning*, <https://www.thisamericanlife.org/241/20-acts-in-60-minutes/act-fourteen-9>
- *Disinfecting Spaces Using Robots*, MITCSAIL, [https://www.youtube.com/watch?v=Kl\\_XZ0iUL04](https://www.youtube.com/watch?v=Kl_XZ0iUL04)
- Yacobi, A. (n.d.). *Brains behind AI*. <https://podcasts.apple.com/us/podcast/brains-behind-ai/id1506235713> [Podcast]

As of July 2020, there are 8 episodes of interviews with successful AI startups. Yacobi's interviews span industries from pharmaceuticals to creative industries and entrepreneurs. Podcasts range from 30 to 45 minutes and can be easily assigned to students for discussion. The podcast format should work well for online students and with new interviews posted frequently, students can report on new interviews throughout the course.

- CIFAR (2019, November 5). *The brains behind AI*. <https://www.cifar.ca/cifarnews/2019/11/05/the-brains-behind-ai>

A group of Canadian researchers provide a variety of perspectives on the field of Artificial Intelligence in a 10-part video series. Videos cover a variety of topics including how computers "learn" language, solve complex problems, and "interact" with humans. A wide range of majors will find interest in the series with discussion points ranging from questions related to the future of work, industry specific impacts, and how AI research can better support equity, diversity, and inclusion.

- Walsh, P. [Econguay]. (2014, January 7). *Don't lose your job to a computer*. <https://www.youtube.com/watch?v=3NMGcyqWKIY>

One of a series of videos designed for young adults, Walsh uses a simple analogy to help students understand how automation technology can replace humans in two simple tasks: memorization and direction following. He demonstrates how students should strive for deeper learning for skill acquisition that will secure a place for them in the workplace of the future. Some of the content is outdated, however, it is a good starting point for discussing how AI augments but does not simply replace human capabilities.



## Career Charter

Students complete their own career charter inspired by their research about the future of work. The charter lets them think about the sort of professional they want to be, their values, and commitments while also reflecting on what they have learned. We recommend it as a concluding assignment. An assignment description for students follows.

Wow! What a semester! You've learned research-based recommendations for effective communication. You have engaged with world-class experts. You developed your noticing, listening, empathy, and narrative skills. You have considered and discussed the future of work and its implications for your career. Throughout, you have considered how your insights might change your practice in the future. It's time to pull your insights and experiences together.

To complete the Career Charter, you need to first gather assignment submissions you see as most relevant to your future in a portfolio of your work. You can include everything if you like but include at least five items at a minimum. Each item should have a descriptive title in the portfolio. Free to include work that you developed in collaboration with your classmates but reference them if you created it together. Review these exemplars of your work. Think about the threads that have run through this semester.

Second, add to this portfolio if it is not already there, a revised version of your checklist for communicating with patients with a paragraph of text that provides context for the checklist. You have already completed one revision to the checklist, which you may use here. You may also revise it further if you wish, but a further revision is not required.

Once you have had a chance to reflect on all this good work, draft a letter to yourself that states your vision of the sort of caregiver you want to be and how you will get there. Take inspiration from these questions:

1. What are your values? How are those values relevant to work?
2. What are your commitments for your future practice?
3. How would you live that out in your life?
4. Who are your allies in this work? Who are the stakeholders?
5. What are the skills that you need to continue to develop? How will you?
6. What does ideal communication in this context look like for you? Why?
7. If you were to tell the story of your career looking back after you retired, what would that story be?

Your letter should be approximately 500 words or more. It should be inspired by these questions, but it should not be an item-by-item list of answers to these questions. Instead, craft a cohesive argument that captures your vision for the sort of professional you plan to be. Feel free to depart from these questions. In keeping with the spirit of the class, feel free to submit a narrative, poem, video, or other piece of art instead of an expository letter. It should reference specific examples from your coursework and specific ideas and concepts from the course material. Be sure to give credit to the authors and creators on whom you draw. Be creative and have fun with assignment! Previous students have submitted portfolio websites, slide presentations, and so forth to pull their work together. Make this your own.



# Relevant Materials

## Resources for Teachers

Ark, T. V. (2020, February 12). *How to teach artificial intelligence*. Forbes. <https://www.forbes.com/sites/tomvanderark/2020/02/12/how-to-teach-artificial-intelligence/#3e690fe85eac>

Although this resource is written primarily for the K-12 audience, it addresses three important concepts for students as they are introduced to automation technologies: the ability to recognize AI, the opportunity to use AI to solve problems, and a pathway for building AI. This third objective will likely appeal primarily to those interested in computer science. In identifying the “five big ideas” every student should know about AI, the author provides a useful introduction to span disciplines and introduce basic automation concepts making this an appropriate reading to assign to students as well.

Krueger, N. (2020, February 4). *3 unplugged activities for teaching about AI*. ISTE. <https://www.iste.org/explore/Computer-Science/3-unplugged-activities-for-teaching-about-AI>

A simple, but useful introduction to AI is provided to demonstrate the capabilities of automation technologies as well as limitations. The video can be used in the classroom or online to prompt discussion. Students can explore their own current use of AI technologies, how AI technologies might be used in their chosen career or job field, and what concerns they have about the influence on the future of work. Three classroom activities are presented with a link to additional activities.

National Bureau of Economic Research (2020, June 4). *The growing importance of social skills in the labor market*. <https://www.nber.org/digest/nov15/w21473.html>

Students are introduced to the importance of social skills in the modern workplace and gain an understanding of the integration of social skills and automation technologies. Communications instructors can highlight the significance of teamwork, the limitations of automation technology, and the importance of social skills. This quick read can be assigned to students, particularly those who are interested in technical careers. Students should be encouraged to discuss which specific skills they might need to introduce and reinforce the importance of what they are learning in the classroom.

Smith, A., & Anderson, M. (2017, October 4). *Automation in everyday life*. Pew Research Center. <https://www.pewresearch.org/internet/2017/10/04/automation-in-everyday-life/>

To explore the complexity of American’s opinions on the outcomes of AI technologies, researchers used various scenarios ranging from autonomous vehicles to computer selected job candidates to conduct a survey of public perceptions. Responses from the survey demonstrate both the hopes and concerns of the average American as well as the broader debate over AI’s impact on society. Discussion and visuals will help students understand perceptions of the impact of automation on the future of work, and how automation technologies are currently being viewed and discussed.

Southern New Hampshire University (2018, October 26). *Why the Liberal Arts will be more important than ever in an AI-enabled workforce*. <https://www.snhu.edu/about-us/newsroom/2018/10/liberal-arts-in-an-ai-enabled-workforce>

This article from a university press release explores the dangers of moving away from a liberal arts education in favor of more technical skills in light of the widespread beliefs about the overtaking of automation technologies. Students can explore how individuals can work along with AI and how companies will continue to need well-rounded employees who possess both technical and social skills despite the added value of automation in the workplace.

Wolla, S. A. (2018, January). *Will robots take our jobs?* Economic Research Federal Reserve Bank of St. Louis. <https://research.stlouisfed.org/publications/page1-econ/2018/01/02/will-robots-take-our-jobs>

As a good introduction to the module learning outcomes, this article addresses a bit of the history of automation technologies, the compliment to human capabilities, and the critical skills necessary for success in a technology driven workplace. Students can use this as a starting point for considering their chosen fields and how they can better equip themselves with the skills needed to be competitive in an AI driven economy.

Zandan, N. (n.d.). *The future of human communication: How artificial intelligence will transform the way we communicate*. Quantified Communications. <https://www.quantifiedcommunications.com/blog/artificial-intelligence-in-communication>

This blog post addresses how artificial intelligence will be used in the workplace and specifically how AI is being used to improve communication and message creation. The discussion will be useful particularly in communications courses and units on business messages as students are introduced to the use of AI to not only simulate an audience, but also to measure the effectiveness of a message in reaching the desired audience and achieving the speaking goal.

## **Readings for Students**

Adcock, S. (2020, February 5). These are the exact skills you need to get a job in artificial intelligence. *Ladders*. <https://www.theladders.com/career-advice/these-are-the-exact-skills-you-need-to-get-a-job-in-artificial-intelligence>

For students focusing solely on the technical aspects of careers in automation and artificial intelligence, this article introduces the non-technical skills required for jobs in the field as well as those skills necessary to remain up-to-date in the industry. The discussion highlights the need for critical thinkers and problem solvers, but will appeal most to those interested in math and science. Students will gain a basic understanding of artificial intelligence and machine learning while also being able to explore specific organizations (Google, Amazon, ExxonMobile, etc.) and the characteristics of job roles through useful links.

Autor, D. H. (2016, September). *Will automation take away all our jobs?* TED. [https://www.ted.com/talks/david\\_autor\\_will\\_automation\\_take\\_away\\_all\\_our\\_jobs](https://www.ted.com/talks/david_autor_will_automation_take_away_all_our_jobs)

Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. *The Journal of Economic Perspectives*, 29(3), 3–30.

Continuing the concern with questions related to the future of work and automation technology, this video demonstrates the importance of relationship building and problem solving as essential human skills necessary for the workplace. Students will find benefit in the discussion of how automation technology has both created new jobs and influenced job *choice* rather than job *availability*. Students might be asked to consider how their skills will translate into what is likely to be a job role facilitated rather than replaced by automation, and the new meaning of a “good” job.

Belsher, J. (2017, September 19). *Training soft skills into AI technology*. Venture Beat. <https://venturebeat.com/2017/09/19/training-soft-skills-into-ai-technology/>

Accepting the fact that machines will soon surpass human capabilities in some areas, the author asks readers to take comfort in soft skills like communication and interpersonal skills as a “new frontier” for technical workers. Students will be introduced to the limited social abilities of computers in reading various human cues. Technical majors can explore the progress in creating algorithms that mimic human behavior and how this might factor in their own careers. Likewise, non-technical majors can analyze how automation technologies are being used to augment human skills in other fields such as education and medicine.

Buranyi, S. (2018, March 3). *How to persuade a robot that you should get the job*. The Guardian. <https://www.theguardian.com/technology/2018/mar/04/robots-screen-candidates-for-jobs-artificial-intelligence>

All students, regardless of major, will face the likelihood of being evaluated for a job by automation technology rather than a human being. This article moves beyond resume building to address the *interaction* with computer technology in responding to interview questions and the algorithms used to rate job candidates. Students can explore how communicative aspects of the job interview (e.g., posture, facial expressions, etc.) are now being evaluated with minimal human involvement. Discussion questions can also be used to explore issues related to bias and discrimination in the hiring process when automation technologies are used.

Karmout, K. (2020, May 20). *Austin based company automating mask production during COVID-19 pandemic*. KXAN. <https://www.kxan.com/news/local/1-2m-masks-in-one-day-austin-start-up-opens-up-facility-in-pflugerville/>

At a crucial time during the Coronavirus pandemic, an Austin-area company addressed the need for masks and other personal protection equipment (PPE) by automating the mask production process. An interview with the company's owner addresses how they met a crucial need and have plans for expansion based on new production technology. This brief report will help students, particularly business majors, understand the impact of automation technologies on supply chain management.

Lamoreaux, A. (2020). *Writing instruction tips for automated essay graders: How to design an essay for a non-human reader*. Open Oregon Educational Resources. <https://openoregon.pressbooks.pub/robograders/>

This book focuses on the use of Automated Essay Graders (AEG) as a crucial factor for college students' understanding of artificial intelligence. Rather than debate pros or cons, students will be introduced to the development of this industry and how AEGs demonstrate important technological changes in a task that is most often thought to be solely human. At the same time, students can explore the components of "reading" when the grading is automated and the common assumptions about writing upon which the programming for automated readers is based. There may not be value in assigning the entire text, but excerpts or entire chapters will provide students with a realistic view of how AI is changing even non-technical roles using a task in which they are currently actively involved.

Science Daily (2016, June 8). *How will automated technology affect communication-related jobs?* <https://www.sciencedaily.com/releases/2016/06/160608104402.htm>

Students can explore the impact of automation beyond technical fields and the blue-collar professions by analyzing the automation of communication. The article explores a National Communication Association study that asks what happens if individuals begin to rely on automation to facilitate the work of interacting with others. Students in non-technical fields can use this information to better understand the impact of AI in a variety of fields from psychology to banking and the teaching profession.

Slayter, M. E. (2019, December 19). *In defense of the Liberal Arts in the age of AI*. Forbes. <https://www.forbes.com/sites/theyec/2019/12/19/in-defense-of-the-liberal-arts-in-the-age-of-ai/#1b890f11754b>

Although this article highlights the fear of jobs loss from automation technology, it provides students with a perspective on the types of soft skills needed in the workplace and how these are cultivated by a liberal arts education making this an attractive read for non-technical majors. More specifically, the author highlights how skills such as creativity, critical thinking, and emotional intelligence will be prized in many fields (including technical); and how employers might evaluate these skills during the job interview process.

## Additional References

These references informed the design of this course and the research effort that guided it.

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